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FINAL REPORT

VISIBLE INFRARED SPIN-SCAN RADIOMETERS (VISSR) FOR THE GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE (GOES) B AND C APPLICATION

Contract No. NAS5-20660

For


National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

1 July 1977

Approved by


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Section 1

INTRODUCTION

This is the final report for NASA/GSFC Contract NAS 5-20660, dated 31 August 1974. The contract provides two Visible Infrared Spin-Scan Radiometer (VISSR) instruments for the Geostationary Operational Environmental Satellite B and C (GOES B and C) spacecrafts. The instruments are identical to those developed and supplied under the previous Contract NAS 5-21139 except for minor electronic changes to the module and scanner and changes to the lubrication utilized for the scan mirror encoder bearings. During the contract period, twelve engineering changes were submitted as proposals of which eleven were accepted and incorporated into the contract. Three of these changes were implemented at no additional contract cost. The Contract specified delivery of the instruments for the GOES B spacecraft 18-1/2 months after initiation of the Contract ARO and for the GOES C spacecraft, 24 months ARO. The first instrument, designated Flight 3, Serial Number 005, was delivered 17-1/2 months ARO. The second instrument, designated Flight 4, Serial Number 006, was delivered 25 months ARO.

Both instruments contain all the listed changes and are electrically and operationally identical. Engineering Changes 010 and 012 were incorporated in the GOES B instrument (S/N 005) by retrofit, and underwent limited retest following initial acceptance and delivery.

The following summarizes changes to these instruments as compared to those supplied on the previous SMS Contract. In addition, there were a significant number of Class II changes primarily involving corrections of drawing errors and omissions. All electrical changes were breadboarded (where complexity required this), were incorporated into the test module, and subjected to verification of proper operation throughout full instrument temperature range. Evaluation of the changes also included design operating safety margins to account for component variations and life. See Table 1-1, Engineering Change Summary.

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Table 1-1. Engineering Change Summary

CHANGE NUMBER	IDENTITY	DESCRIPTION
BASIC CONTRACT	REGULATED TEMPERATURE TELEMETRY SUPPLY VOLTAGE	INCREASES TEMPERATURE TELEMETRY ACCURACY.
BASIC CONTRACT	SUBSTITUTE TELEMETRY SUPPLY VOLTAGE IN LIEU OF REDUNDANT ENCODER TEMPERATURE	RESULT OF REASSESSING TELEMETRY PRIORITIES.
001	REDUNDANT "STEP SCAN ON" COMMAND	PROVIDES A BACK-UP COMMAND IN CASE THE NORMAL "STEP SCAN" ON" COMMAND SHOULD FAIL.
003	CHANGE IN THERMAL SURFACES	REPLACES THE AFT COVER AND THE ENCODER COVERS WITH COVERS HAVING POLISHED SURFACES. THE ORIGINAL COVERS USED THERMAL TAPE THAT WAS A POSSIBLE SOURCE OF OPTICAL CONTAMINATION.
004	REWORK SMS/VISSR ENCODERS (GFE)	UPGRADE THE GFE SMS/VISSR ENCODERS S/N 006 AND S/N 007 TO FLIGHT QUALITY FOR USE AS VISSR/GOES SPARES.
005	CONNECTOR KEYING PROVISIONS (VISSR)	THE SMS/VISSR SPACECRAFT CONTRACTOR MODIFIED CERTAIN CONNECTORS WITH A KEYING ARRANGEMENT TO AVOID IMPROPER CONNECTIONS. THIS CHANGE DUPLICATES THIS MODIFICATION FOR THE TWO GOES INSTRUMENTS.
006	ADDITIONAL IN-FLIGHT OPERATIONAL CAPABILITY FOR GOES B AND C	THIS CHANGE PROVIDES THE CAPABILITY TO INITIATE THE CALIBRATION SEQUENCE WITHOUT THE NECESSITY OF MIRROR TRAVEL TO THE SOUTH OR THE NORTH SCAN LIMITS. IN ADDITION, CAPABILITY IS PROVIDED FOR COMMANDING THE FRAME SIZE THAT EXCEEDS THE NORMAL FRAME ELECTRICAL LIMITS.
007	ENCODER 006 BEARING LUBRICATION; CHANGE BURNISHED MoS ₂	RESCINDS PREVIOUS DIRECTION REGARDING BEARING LUBRICATION UTILIZING BURNISHED MoS ₂ BEARINGS FOR THE ENCODER ASSEMBLIES.
008	GOES C ENCODER BEARING; CHANGE SPUTTER MoS ₂	REWORK OF THE GOES C ENCODERS TO INCORPORATE THE IMPROVED BEARING LUBRICATION METHOD.
009	GOES B ELECTRONIC MODULE HOUSING REPAIR	REPAIR OF THE ELECTRONICS MODULE FOLLOWING DAMAGE CAUSED BY A GROUND STRAP SCREW PROTRUDING INSIDE THE MODULE DURING SPACECRAFT INTEGRATION.
010	DESIGN MODIFICATION TO SCAN DRIVE ELECTRONICS TO REDUCE CURRENT TRANSIENTS DURING RETRACE	THIS CHANGE IS AN IMPROVEMENT OF THE ORIGINAL CIRCUITRY TO MINIMIZE BANG-BANG MODE OPERATION OF THE SCAN DRIVE DURING RETRACE WITH HIGH FRICTION BEARINGS.
011	DESIGN MODIFICATION TO ELIMINATE THE RELAY BOUNCE ASSOCIATED WITH COMMAND TO THE LONG FRAME MODE	ELIMINATES A POSSIBLE LOGIC DISRUPTION WHEN THE LONG FRAME IS SELECTED.
012	GOES B ENCODER RETROFIT	REPLACE THE GOES B ENCODERS WITH ENCODERS HAVING THE IMPROVED SPUTTERED MoS ₂ BEARING LUBRICATION.

Section 2 ELECTRONIC CHANGES

BACKUP FOR STEP SCAN ON COMMAND (Engineering Change Order 001)

An alternate method was provided to command scan mirror stepping action in order to circumvent a single point failure mode that would render the scan drive inoperative.

The Step Scan ON command pulse is regenerated in the VISSR by a trigger circuit and coupled through a pulse transformer to provide isolation between command ground and auxilliary power ground as shown in Figure 2-1. (Dwg 45211). This nonredundant circuit drives both the primary and redundant scan logic boards. In the event of a failure in the command isolator circuit, an emergency work-around procedure would be required to obtain scan mirror motion. The only means of obtaining stepping action would be to momentarily interrupt VISSR power or momentarily transfer to the other scan drive, whereupon the step scan logic would be initialized in the ON condition. Continuous scanning could then be obtained if the Scan Reverse command were issued just prior to reaching the top of frame where the Step Scan OFF function occurs. However, the calibration function would be lost because it is activated at the top of frame.

To prevent this operating problem that would result from a failure in the single command isolator circuit, either a redundant command isolator circuit could be added or another command could serve double duty. The added duplicate circuit would require re-layout of the circuit board whereas the backup command could be very simply summed through a resistor, but would require minor changes in operating procedures. The latter approach was implemented with the Scan Range Normal command also serving to cause the Step Scan ON function to occur. The VISSR waits at the top of the frame for the Step Scan ON command where the transfer to normal rate timing has already occurred automatically after completion of retrace at the rapid step

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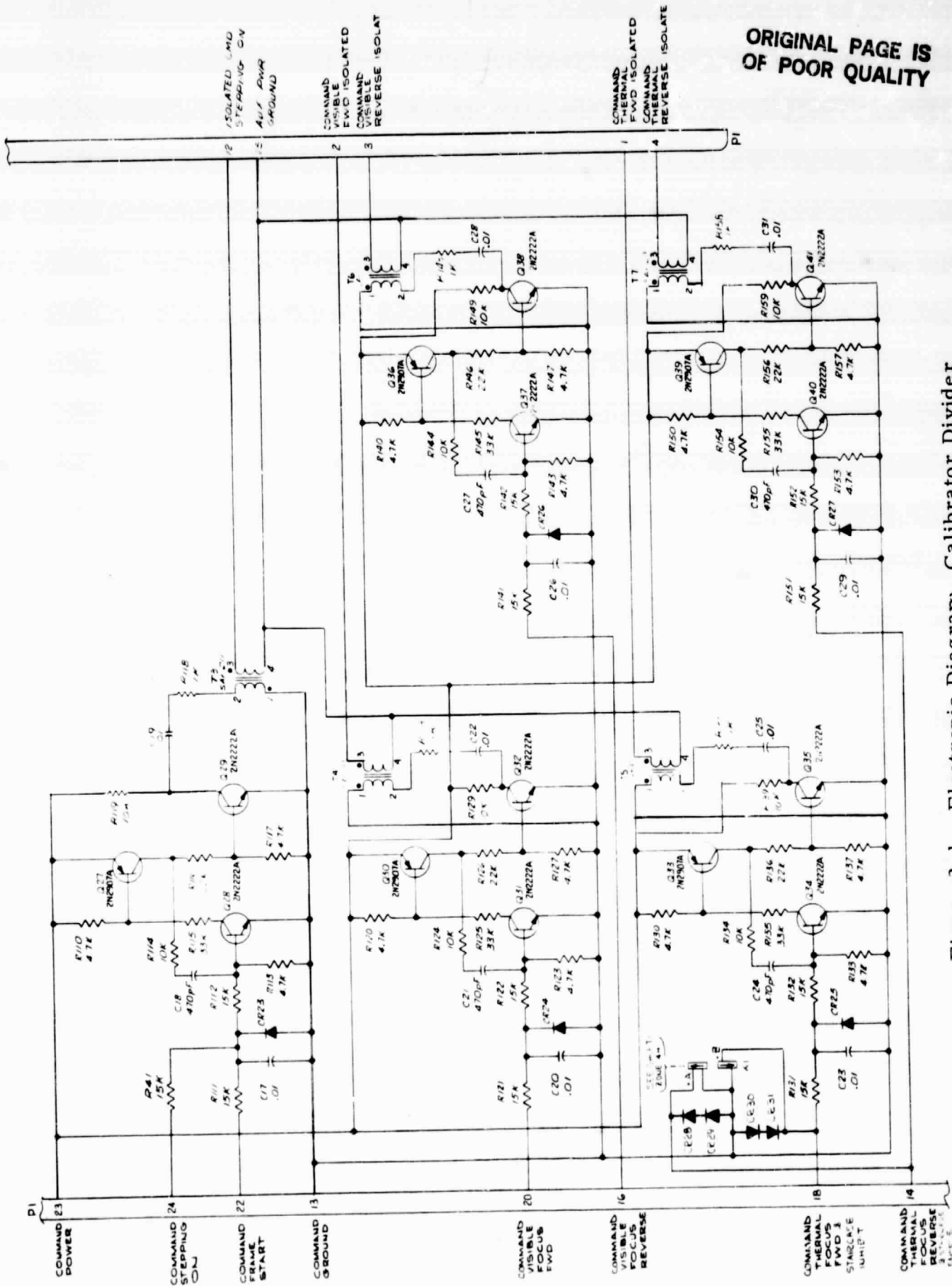


Figure 2-1. Electronic Diagram, Calibrator Divider

rate. Thus, to issue the Scan Rate Normal command as a backup for Step Scan ON would cause no change in VISSR response for this condition.

The circuit was changed by ORing the Step Scan ON and Scan Rate Normal isolated commands at the base of transistor Q8 to set the Scan ON/OFF flip-flop U17 to the ON state. The Step Scan ON command does not affect the Scan Rate Normal function. See Figure 2-2 (Dwg 45138).

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Figure 2-2. Electronic Diagram, Scan Drive Logic (A3 & A5)

REDUCED SCAN DRIVE CURRENT TRANSIENTS

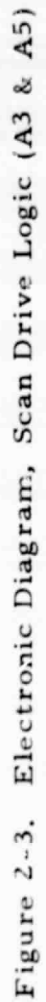
This change provides improved control of the scan drive for precise updating of control logic based on encoder position rather than a fixed time reference. This minimizes bang-bang mode switching and the resulting power transients particularly during rapid stepping.

An increase in bearing friction causes the scan mirror position encoder to lag behind in time from the reference ramp signal generator. The logic word in the scan line logic register is updated at midstep by the ramp generator 27 msec after the step timing signal. If the encoder does not make its scan line word transition at nearly the same time, the scan servo will switch from the linear mode to the bang-bang mode. This applies nearly full drive to accelerate the mirror to achieve agreement of the two logic words. The excess drive from the bang-bang must then be countered by a short period of reverse drive to decelerate the mirror once the logic words agree, and the servo is operating in the linear mode. This type of erratic scan drive operation causes unnecessary power consumption particularly in retrace where the duty cycle is high.

The design change (See Figure 2-3, Dwg 45138) involves slaving the ramp generator to the encoder so that the scan logic word updates when the encoder word changes at midstep. Drive is applied until the encoder reaches the desired position rather than for a fixed time interval of 27 msec which requires smooth, low friction bearings. The modified circuit can typically accommodate bearing drag of 20 in. -oz and continue to operate smoothly in the linear mode. The drag of the molydisulphide lubed encoder bearings is typically 4 to 5 in. -oz for the combined encoders.

Tests on the GOES B VISSR by the spacecraft contractor showed a reduction in VISSR average input power during retrace from 7 watts to less than 1 watt after the circuit modification.

1-5 95-50



CALIBRATION CIRCUITRY ACTIVATED BY COMMAND

A requirement on previous instruments was that the VISSR internal calibration sequence should only occur at the north frame limit. The calibration logic was enabled at the first scan step and clocked by the restore timing pulse to generate a 5-level staircase. This function provides a gain check on the visible and infrared channel amplifiers. Additionally, the IR calibration target comes into the field of view (FOV) on the third scan line if its motor has been enabled by command prior to the start of the calibration sequence. Another staircase occurs on the fourth line after which the calibration logic is locked out. The logic is similarly cycled after reaching the south frame limit by four de restore timing pulses, but the staircase and target motor drive circuits are inhibited. If the south limit is not reached, the logic is not recycled and cannot respond at the next north limit.

The original intent of this change was to allow use of the calibration even if the scan mirror could not reach the south limit due to intentional short frame operation or scan mirror bearing lubrication build up problems.

A design change for the GOES B and C instruments provides the capability to override the calibration logic lockout in response to certain commands whereby calibration can now be obtained on short frames. The calibration logic is activated by the transition of the scan direction latch U14 on Scan Logic Schematic 45138 (Figure 2-4). The latch was previously controlled by the south frame limit comparator, but now is also controlled by the forward-reverse flip-flop U16 in response to the Scan Direction Reverse command. Thus, it is no longer necessary to reach the south frame limit to recycle the calibration logic.

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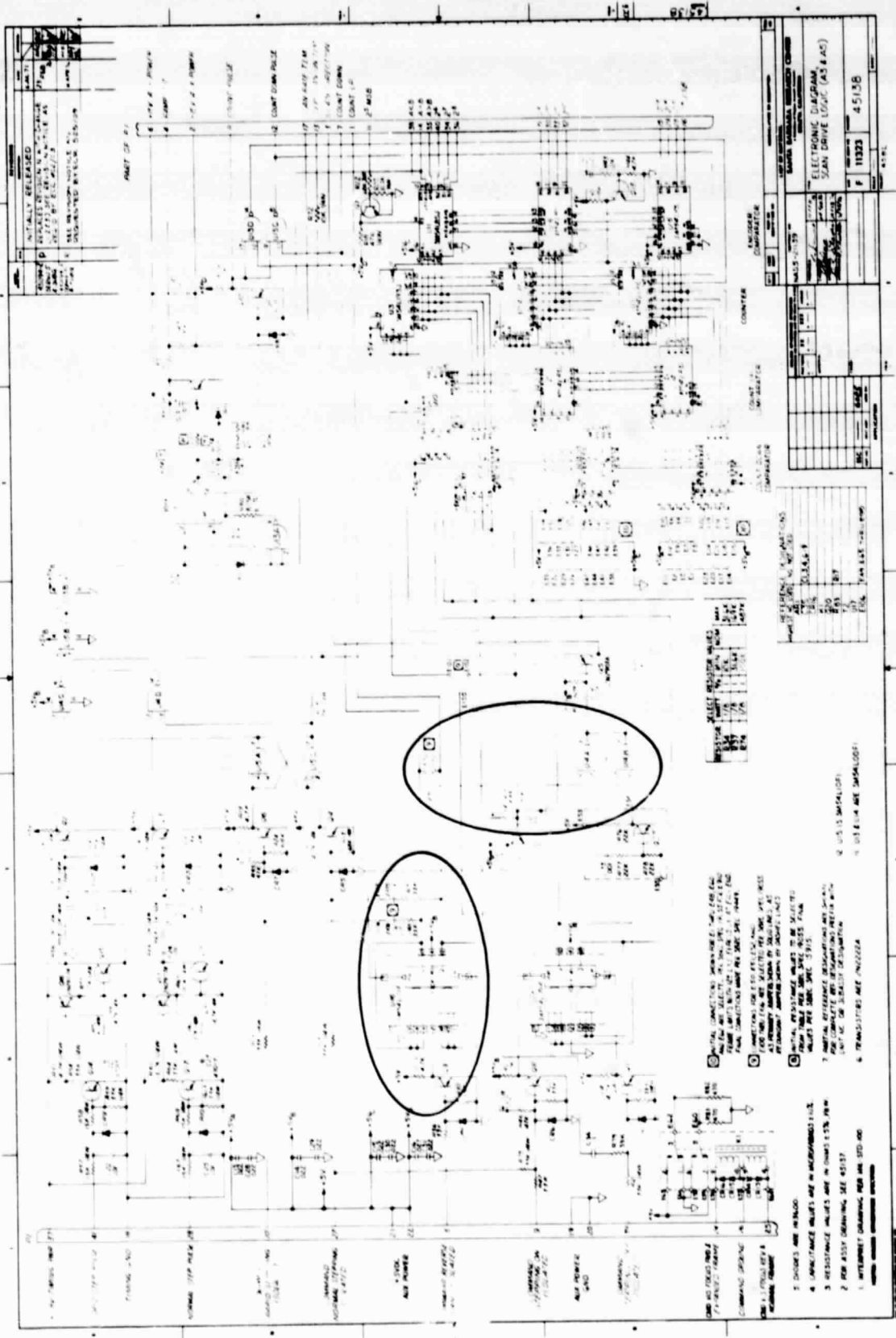


Figure 2-4. Electronic Diagram, Scan Drive Logic (A3 & A5)

The other transition of the scan direction latch was previously controlled by the north frame limit comparator, but now also has a lockout override. The state of the latch is changed by a pulse derived from the ON transistion of the scan ON/OFF flip-flop U17. See Figure 2-5 (Dwg 45138). Thus, to obtain a calibration sequence during short frame operation, the procedure requires:

1. A Scan Direction Reverse Command from forward to reverse to recycle the calibration logic and to retrace to the appropriate start line;
2. Another reverse command for forward scan direction;
3. A Step Scan OFF command to enable the latch trigger circuit; and
4. The Step Scan ON command to activate the trigger for the latch that initiates the calibration sequence.

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COMMANDABLE LONG FRAME

This change provides the capability to increase the size of the scan frame to roll out possible encoder bearing lubrication build-up at the ends of the normal frame.

An electronic design change was implemented whereby the visible channel focus commands were made dual function commands to add the expanded frame capability. Issuing a single Visible Focus Forward command thus also causes expanded frame size and conversely, Visible Focus Reverse command results in normal frame size. The command pulse drives an added latching relay whose contacts control the logic word in the frame limit comparators of the scan logic. See Figure 2-6 (Dwg 45138). The expanded frame has 128 additional steps at each end.

Entry into expanded frame operation can be initiated at any scan line during the normal frame whereby the frame will be bounded by the expanded frame limits. The expanded frame mode is terminated by issuing a single Visible Focus Reverse command when at a scan line within the limits of the normal frame. If the normal frame command is issued when in the expanded frame segment, operation will vary depending on which scan drive is being used. For example, if normal frame is commanded when in the north expanded segment during retrace with redundant drive, the scan rate will immediately change from rapid to normal, and scan direction will reverse to provide stepping toward the north normal frame limit where it will stop. However, for the primary scan drive in the north expanded segment, issuance of the Visible Focus Reverse command to return to normal frame will cause retrace stepping action to stop immediately. Issuance of a Step Scan ON command will then result in stepping toward the south limit at the normal rate without stopping at the north normal frame limit until this limit is approached from the retrace direction.

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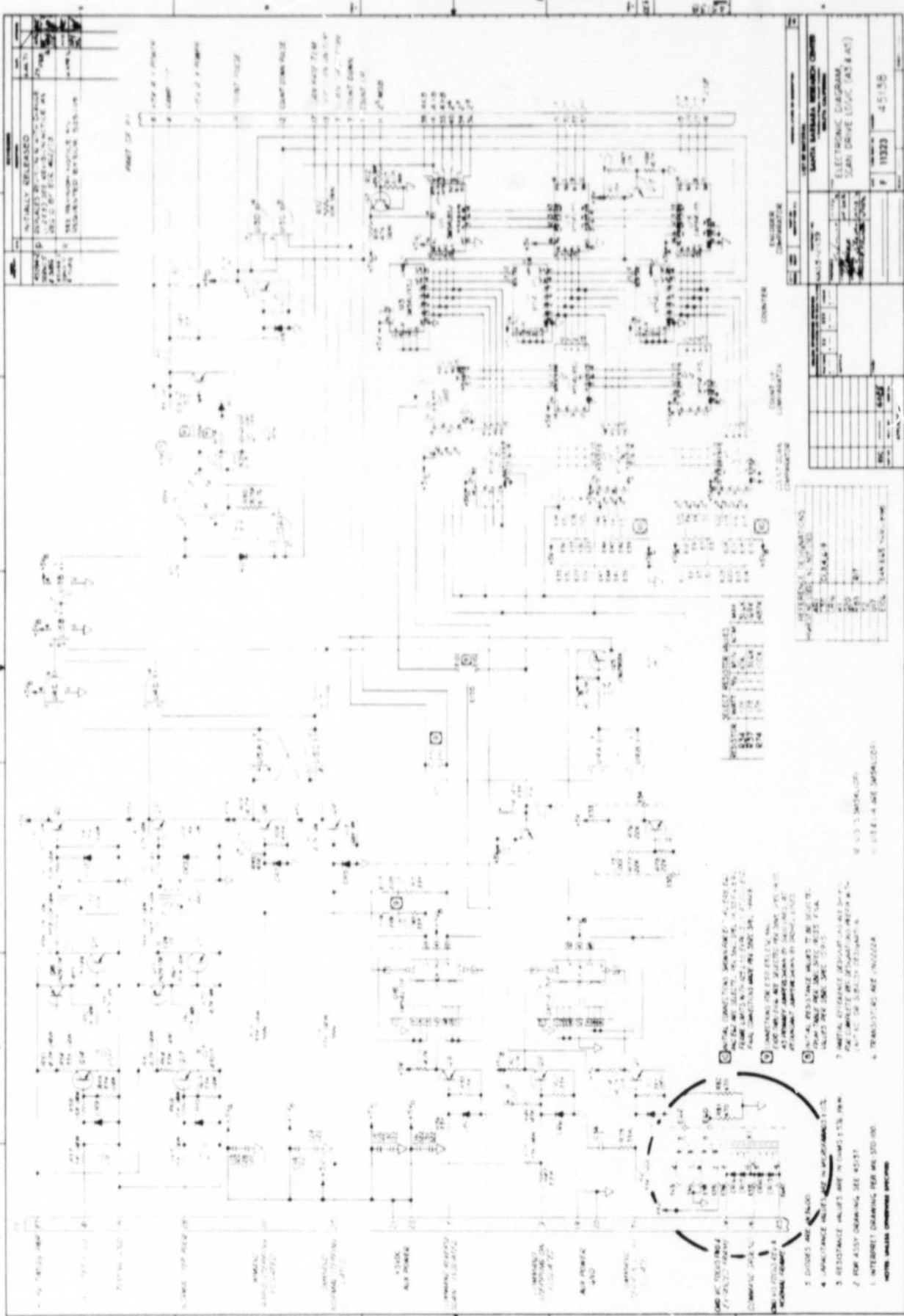


Figure 2-6. Electronic Diagram, Scan Drive Logic (A3 & A5)

The commandable long frame capability was added to compensate for the lubrication buildup in the Rulon bearings that were originally fitted in the GOES B VISSR encoders. Now that the bearings have been replaced on both GOES B and C instruments with molydisulphide lubricated bearings, the use of the commandable long frame function is not anticipated.

IMPROVED ACCURACY FOR TEMPERATURE MONITOR CIRCUITS

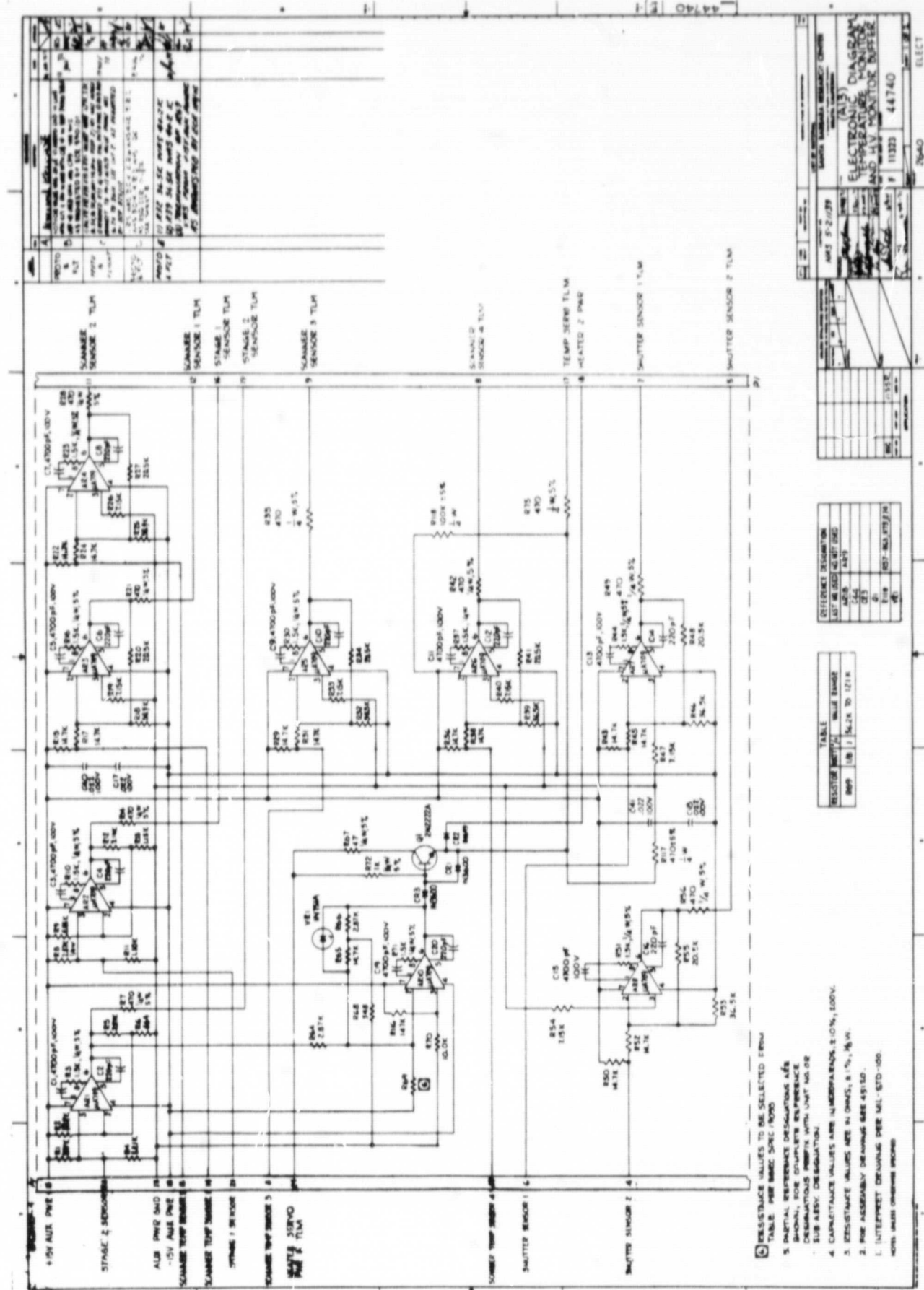
The VISSR calibration depends on the accuracy of the temperature source in the scanner assembly, particularly the calibration shutter temperature sensor. The design change improves the specified temperature accuracy to 0.2°C as compared to an unspecified value for previous VISSR instruments.

The change involves the use of 0.05°C accuracy thermistors and redesign of the bias circuits for the sensors and the telemetry scaling circuit to operate from regulated +12 volts. These circuits in previous SMS VISSR instruments (See Figure 2-7, Dwg 44740) were powered from unregulated ± 15 volts supplied from the VISSR dc-dc converter via the spacecraft 29-volt source. This arrangement was sensitive to voltage changes caused by variations in loading imbalance and temperature changes. Suitable corrections to the temperature telemetry data could not be made based only on +15 volt telemetry without the -15 volt data which is not telemetered.

The circuit design change added an integrated circuit voltage regulator to the A13 Temperature Monitor circuit board to provide a stable +12 volt source for the temperature sensing elements. Furthermore, any dependence on the unregulated -15 volt supply to provide the zero reference offset to the sensors was removed by applying instead an offset voltage derived from the regulated +12 volt source to the noninverting differential input of the scaling amplifier. See Figure 2-8 (Dwg 49365).

The +12 volt source is provided for telemetry at a 4-volt maximum value via a voltage divider and brought out on the circuit board connector that previously carried the telemetry signal for the redundant encoder temperature monitor. This monitor circuit was deleted to make room for the regulator. The temperature monitor circuit for the electronics module which is located on the A9 circuit board was not modified to use the regulated +12 volts. The operating point for the IR detector temperature servo is now

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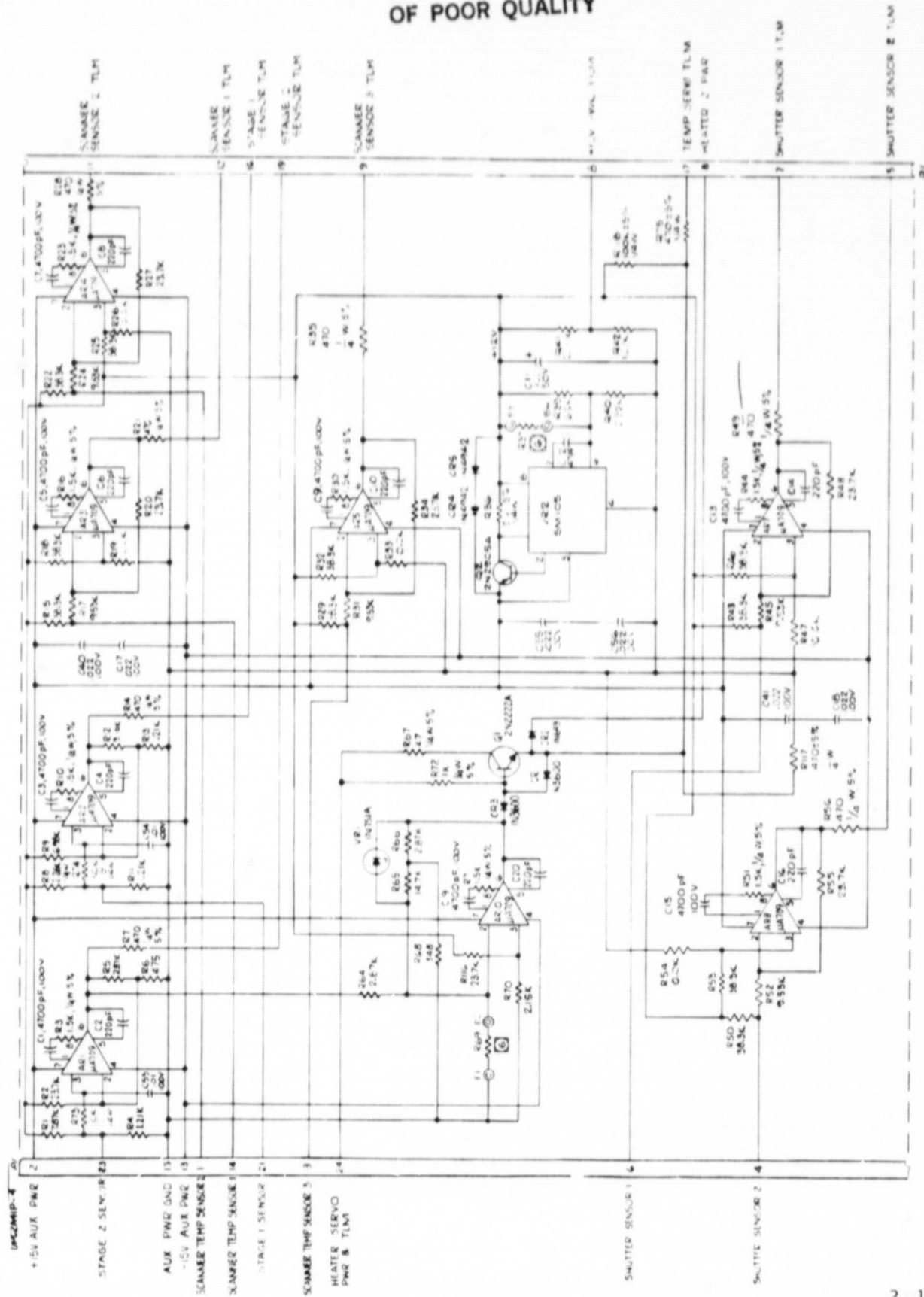


Figure 2-8. Electronic Diagram Temperature Monitor and H. V. Monitor Buffer

set by a voltage derived from the +12 volt regulated source instead of the unregulated -15 volt source. This provides a more nearly constant IR detector signal output by holding the detector at a set temperature in the range 90° to 95°K.

Section 3

MECHANICAL CHANGES

Two changes occurred during the contract period affecting the mechanical configuration. The first was the alteration of thermal control surfaces (Engineering Change 003), and the second, was the change in the scan drive lubrication (Engineering Change 008 and 012).

THERMAL CONTROL SURFACES

The VISSR has the following four thermal control surfaces:

1. End cover over the scan mirror cavity
2. Encoder covers
3. Radiative cooler shield
4. Radiative cooler adapter

The first three items are surfaces covered with reflective tape, and the fourth is covered with a thermal blanket.

During the SMS program, there was evidence of debris in a cavity adjacent to the primary mirror that apparently migrated from the thermal control reflective tape. If this had not been noticed, it is conceivable that the debris could have migrated into an area around the primary focal plane and caused an optical obscuration. This being the case, the tape was eliminated from areas in the vicinity of the scan mirror opening.

The proposed and subsequently approved proposal for eliminating this potential problem in the GOES B and C instruments was to eliminate the tape and perform the same function by use of polished reflective finishes on the applicable surfaces. This resulted in the use of a polished aluminum end cover over the scan mirror cavity, and polished aluminum encoder covers.

The changes are indicated in Figure 3-1 - a drawing of the end cover, and Figure 3-2 - a photograph of the encoder cover. A sample of the polished aluminum was forwarded to NASA/GSFC where it was verified that the new surface met or exceeded the emissivity requirements previously provided by the reflective tape.

SCAN DRIVE BEARING LUBRICATION

SMS 1 developed a VISSR scan drive anomaly following nine months of operational use. The scan mirror stalled at the south end of the frame near the normal frame limit. The anomaly resulted in narrowing of the useful frame as a function of operational time. Investigations revealed that the problem was caused by abnormal lubrication buildup in the scan drive bearings at the frame end. The problem resulted in an extensive effort for determining an optimum lubrication method to assure trouble-free operation of future instruments. The original bearing lubrication method utilized burnished MoS_2 on the balls and raceways together with a Rulon "A" ball cage. This method, because of the limited bearing rotation, resulted in excessive lubrication buildup at the scan limits to the extent of causing excessive bearing friction. The optimum lubrication method has been determined to be a sputtered MoS_2 lubrication system precisely controlled to a thin application together with a bronze bearing retainer rather than the Teflon/lubrication transfer type retainer. This improved scan drive lubrication method is used on the GOES B and C instruments. The lubrication investigation and development are described in a detailed report included in Appendix A.

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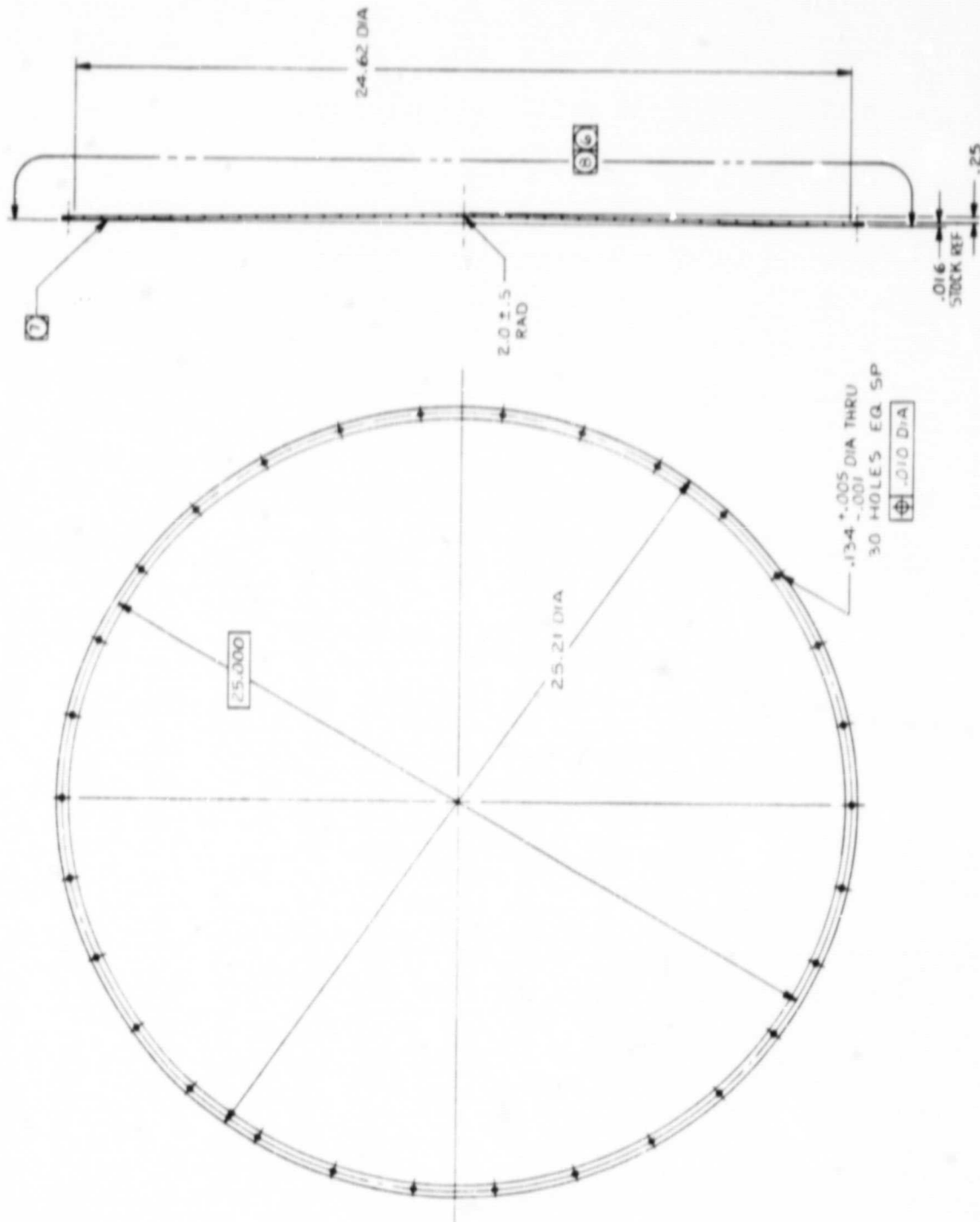


Figure 3-1. Encoder End Cover

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Figure 3-2. Encoder Torque Motor with Cover

Section 4

SUMMARY OF FAILURE REPORTS
FOR BOTH INSTRUMENTS UP TO 15 NOVEMBER 1976

FAILURE REPORT SUMMARY

Project 4522 - A023		Project Reliability Engineer G. Barnett				
Failure Report No. SPRC GSFC	Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
1. 8088 D-05247	IPS SN 109 Destroyed in test.	Workmanship	Closed	5/22/75	6/5/75	- -
2. 8846 D-05248	-15V applied to +15V terminals of the dual 5V regulator	Workmanship	Closed	6/2/75	6/5/75	GOES B
3. 8090 D-05249	Initial Board Test 19055. Gain change inoperative, channel 4. Low resistance between windings of T1-4 pins 1 and 4.	Part Supplier	Closed	6/11/75	8/12/75	GOES B
4. 8092 D-05250	Initial Test 19055. Iso- lated command pulse does not appear at pin 4.	Workmanship	Closed	6/20/75	7/15/75	GOES B
5. 8091 D-05251	Initial Test 19055. For- ward/reverse flip-flop 016 does not change state properly.	Workmanship	Closed	6/20/75	7/15/75	GOES B

- (a) Workmanship
- (b) Design
- (c) Part Supplier
- (d) Test Equipment

FAILURE REPORT SUMMARY

Project 4582 - A023						
Project Reliability Engineer G. Barnett						
Failure Report No. SBRC GSFC	Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
6. 8095 D-05252	Initial Test 19055. Workmanship Gain, change function inoperative, Channel 4. Incorrect wiring.	Workmanship	Closed	6/20/75	7/16/75	GOES B
7. 8202 D-05253	Power Supply subassy. test 19055. +15V output at +17.9V does not adjust with R10 and R19 -15V output at 0V. Incorrect wiring.	Workmanship	Closed	6/24/75	9/12/75	GOES B
8. 8203 D-05254	Test of visible focus range. Test module connected to J box. Visible focus motor does not respond to commands.	Workmanship	Closed	6/25/75	9/15/75	GOES B
9. 8204 D-05255	Test or Scan Logic Board Fwd/Rev Flip-Flop U16 does not change state.	Unknown	Open Waiver #013	7/14/75	-----	GOES B
10. 8226 D-05256	Preamplifier fails to pass signal per SBRC 19055 para 3.5.1 due to short between E10 and E11.	Workmanship	Closed	8/4/75	7/30/76	GOES C

- (a) Workmanship
- (b) Design
- (c) Part Supplier
- (d) Test Equipment

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FAILURE REPORT SUMMARY

Project 4582 (A023)		Project Reliability Engineer G. Barnett				
Failure Report No.	Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
SERC GSEC						
11. 8205 D-05257	Redundant scan drive logic fails to initialize in step scan on mode when power is switched from pri-scan to rdt scan.	Design	Closed	9/18/75	10-21-75	GOES B
12. 8206 D-05258	Primary power supply -15V signal output reads -1.8 (E-B of Q5 found open.)	Unknown	Open Waiver #014	9/18/75	-----	GOES B
13. 8230 D-05259	Redundant scan amp fails to drive encoder forward. (Q1 found to have open B-E junction.)	Workmanship	Closed	9/18/75	10-21-75	GOES B
14. 8231 D-05260	VIS preamp inconsistent .DC offset through the temperature range.	Design	Closed	9/26/75	7/30/76	GOES C
15. 8207 D-05261	Scan Drive malfunction due to 5 Volt supply oscillation at reduced voltage	Design	Closed	10/5/75	10-21-75	GOES B
16. 8218 D-05262	Test cable wiring error.	Workmanship	Closed	10/10/75	10-21-75	GOES B
17. 8232 D-05263	5V overload due to wiring error.	Workmanship	Closed	10/14/75	7/30/76	GOES C
18. 8233 D-05264	Chan 1 remains in Gain 4, Chan 2 does not pass signal, Chan 3 oscillates in Gain 4 state. (Part of trace missing from U1-12 to U1-1-5; wire from term R49-2 connected to pin 9 instead of pin 11.)	Workmanship	Closed	10/16/75	7/30/76	GOES C
(a) Workmanship						
(b) Design						
(c) Part Supplier						
(d) Test Equipment						

- (a) Workmanship
(b) Design
(c) Part Supplier
(d) Test Equipment

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FAILURE REPORT SUMMARY

Project 4582 - A023		Project Reliability Engineer G. Barnett					
Failure Report No. SBRC GSFC		Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
19.	8234 D-05265	At initial board test, absence of ramp inversion per test spec. 19055 para. 3.12.10.6. (Feed through between U6-14 and U5-3 missing.)	Workmanship	Closed	10/17/75	7/30/76	GOES C
20.	8235 D-05266	At initial bench test the RDT bridge operation exhibits rough transitions thru zero per SBRC spec 19055 (G12 and G24 show poor saturation capability.)	Design	Closed	10/17/75	7/30/76	GOES C
21.	8236 D-05267	During initial test per 19055 FWD-REV command turns circuit on and off (jumper E-49 to E51 was not removed per print.)	Workmanship	Closed	10/20/75	7/30/76	GOES C
22.	8237 D-05268	During initial test the circuit indicated excessive channel offset drift per SBRC 19055 para 3.6.	Design	Closed	10/22/75	7/30/76	GOES C
23.	8216 D-05269	+15V signal = 18.0V and does not adjust with R19 according to procedure 19055 para 3.4.5. initial test.	Workmanship	Closed	11/13/75	7/30/76	GOES C
24.	6511 D-05270	Loss of +15VDC regulated supplies during bench test.	Test Equip.	Closed	11/23/75	1/9/76	GOES B

- (a) Workmanship
- (b) Design
- (c) Part Supplier
- (d) Test Equipment

FAILURE REPORT SUMMARY

Project 4582 - A023		Project Reliability Engineer G. Barnett				
Failure Report No. SERC GSFC	Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
25. 8221 D-05271	Ramp generator quit during functional test per SBRC 19055. Select resistors were temporarily attached at this time.	Workmanship	Closed	11/25/75	7/30/76	GOES C
26. 8287 D-05272	No stair case on thermal channel #1. Electronics module outside of the chamber, scanner at 45°C, P=3.6 X 10 ⁻⁷ . Preliminary calibration test configuration.	Design	Closed	12/2/75	1/9/76	GOES B
27. 7227 D-05273	Unable to receive indication at test panel of thermal focus limit actuation. Loss of vis. focus motor actuation. Tests performed during pre T/V bench test at El Segundo.	Test Equip.	Closed	11/26/75	1/9/76	GOES B
28. 8286 None	Computer punch malfunction unrelated to flight equipment. Not a failure. Cancelled.	-----	Cancelled	12/2/75	-----	GOES B
29. 8431 D-05274	Degradation in optical figure of scan mirror from .9 to 1.0 fringe to 1.5 fringe.	Workmanship	Closed	2/12/76	7/30/76	GOES C

(a) Workmanship
(b) Design
(c) Part Supplier
(d) Test Equipment

- (a) Workmanship
- (b) Design
- (c) Part Supplier
- (d) Test Equipment

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FAILURE REPORT SUMMARY

Project 4582 - A023		Project Reliability Engineer G. Barnett					
Failure Report No. SERC GSFC		Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
30.	7226 D-05275	Short measured at Pin #9 of J627. Over current measured while attempting to stow mirror at S/C tests	Design	Closed	3/3/76	7/30/76	GOES B
31.	8336 D-05277	Current noise spikes observed when scan drive passes through zero level.	Design	Closed	3/25/76	7/30/76	GOES B
32.	8272 D-05278	Leakage current in one phase of Visible Focus Drive - J30 Pin 9 5-15 ma in off state. Intermittently occurs throughout temp. range.	Unknown	Waiver #023	3/31/76		GOES B
33.	8273 D-05279	Redundant scan drive scan rate does not change from normal to rapid at bottom of frame turn-around. Responds to separate rapid command.	Design	Closed	3/31/76	9/10/76	GOES B
34.	8274 D-05280	Module test -10°C. Calibrate relay (A8K4) is reset at power turn on. Should stay latched.	Design	Closed	3/31/76	9/10/76	GOES B

- (a) Workmanship
- (b) Design
- (c) Part Supplier
- (d) Test Equipment

FAILURE REPORT SUMMARY

Project 4582		Project Reliability Engineer G. Barnett				
Failure Report No.	Discrepancy	Cause*	Status	Date Occurred	Date Closed	Model
35. 8391 D-05282	Thermal channel focus counter will not step in the forward direction.	Test Equipment	Closed	6/26/76	7/29/76	GOES "C"
36. 7384 D-05284	Mtf. and cross talk out of spec.	Workmanship	Closed	6/29/76	7/29/76	GOES "C"
37. 8541 D-05286	Thermal Channel focus counter will not step in the reverse direction	Test Equipment	Closed	7/21/76	7/29/76	GOES "C"
38. 8542 D-05288	VIS chan. 4 does not respond to gain step cmd.	Workman-ship	Closed	8/4/76	9/13/76	GOES "C"
39. 8543 D-05289	Minor scan mirror contamination	Workman-ship	Closed	8/18/76	9/13/76	GOES "C"
40. 8544 D-05290	No response to step scan on cmd. at -10°C	Unknown	Waiver #022	8/21/76	-	GOES "C"
41. 8483 D-05291	Step scan "On" cmd. errors in data	Unknown	Waiver #022	8/22/76	-	GOES "C"

- (a) Workmanship
- (b) Design
- (c) Part Supplier
- (d) Test Equipment

Section 5

INTEGRATED PHOTOSENSOR (IPS) POTTING VOID PROBLEM

The first indication of a problem with the Integrated Photosensor (IPS) units was when the GMS-1 radiometer had a high-voltage failure in IPS S/N 009. This was found to be the result of a potting void under the high-voltage multiplier board. Figure 5-1 shows a drawing of the IPS cross section. The area of failure is near the right-hand vertical standoff on the lowermost board just above the photomultiplier. Figure 5-2 through 5-4 are photos of the actual partially dissected high-voltage converter. The black spot in the right-hand portion of both photos is the area of the failure. Table 5-1 gives the operating history of this GMS failed IPS unit.

Table 5-1. Operating History of GMS IPS SN 009

VACUUM TESTS AT EMR	100 hours
VACUUM TESTS AT SBRC WHILE INSTALLED IN THE VISSR	600 hours
VACUUM TESTS AT THE SPACECRAFT LEVEL	<u>20</u> hours
	720 hours TOTAL VACUUM TIME
IPS FAILED 20 hours INTO THE FIRST SPACECRAFT VACUUM EXPOSURE	
THE LONGEST PREVIOUS EXPOSURE WAS 360 hours	

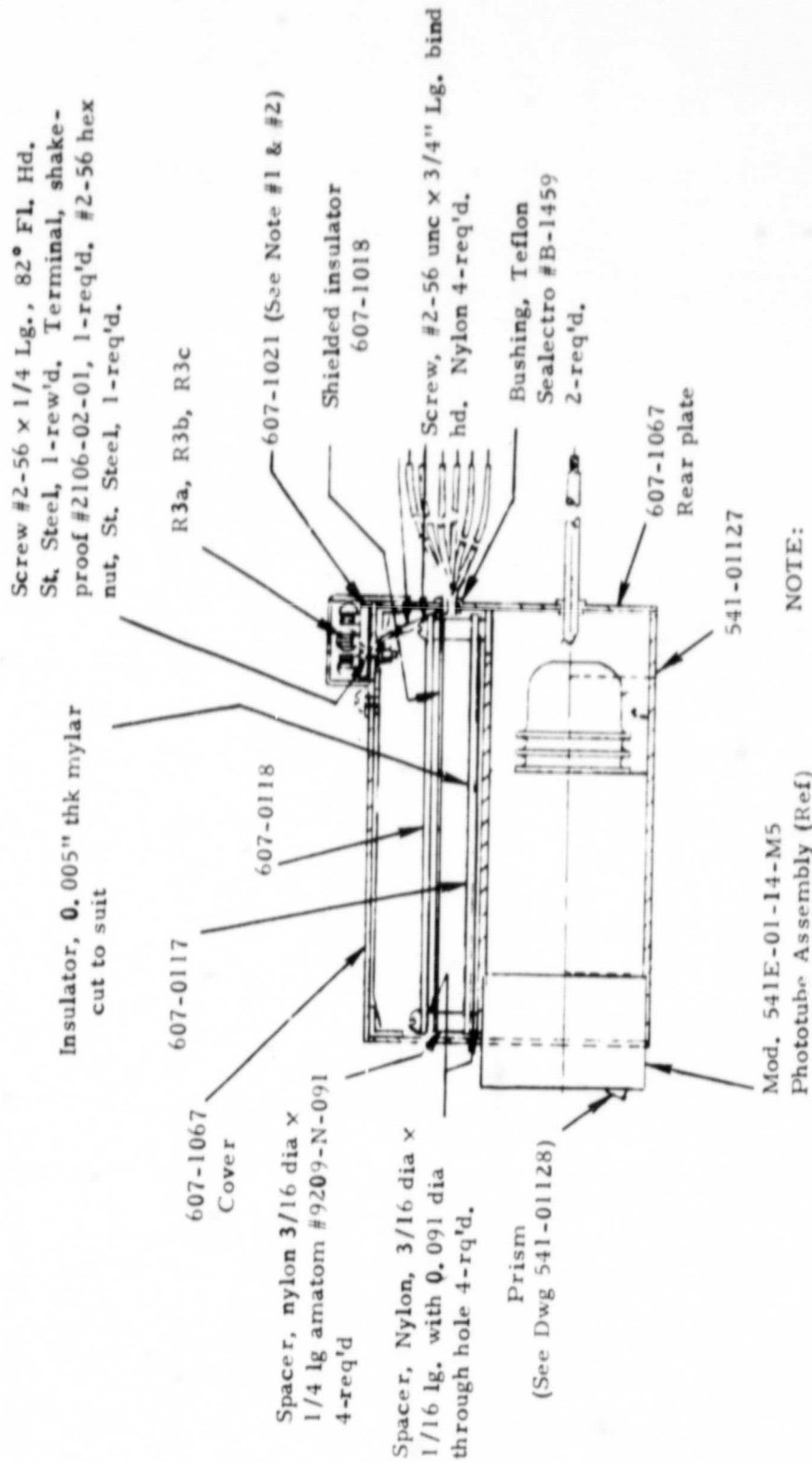


Figure 5-1. IPS Cross Section

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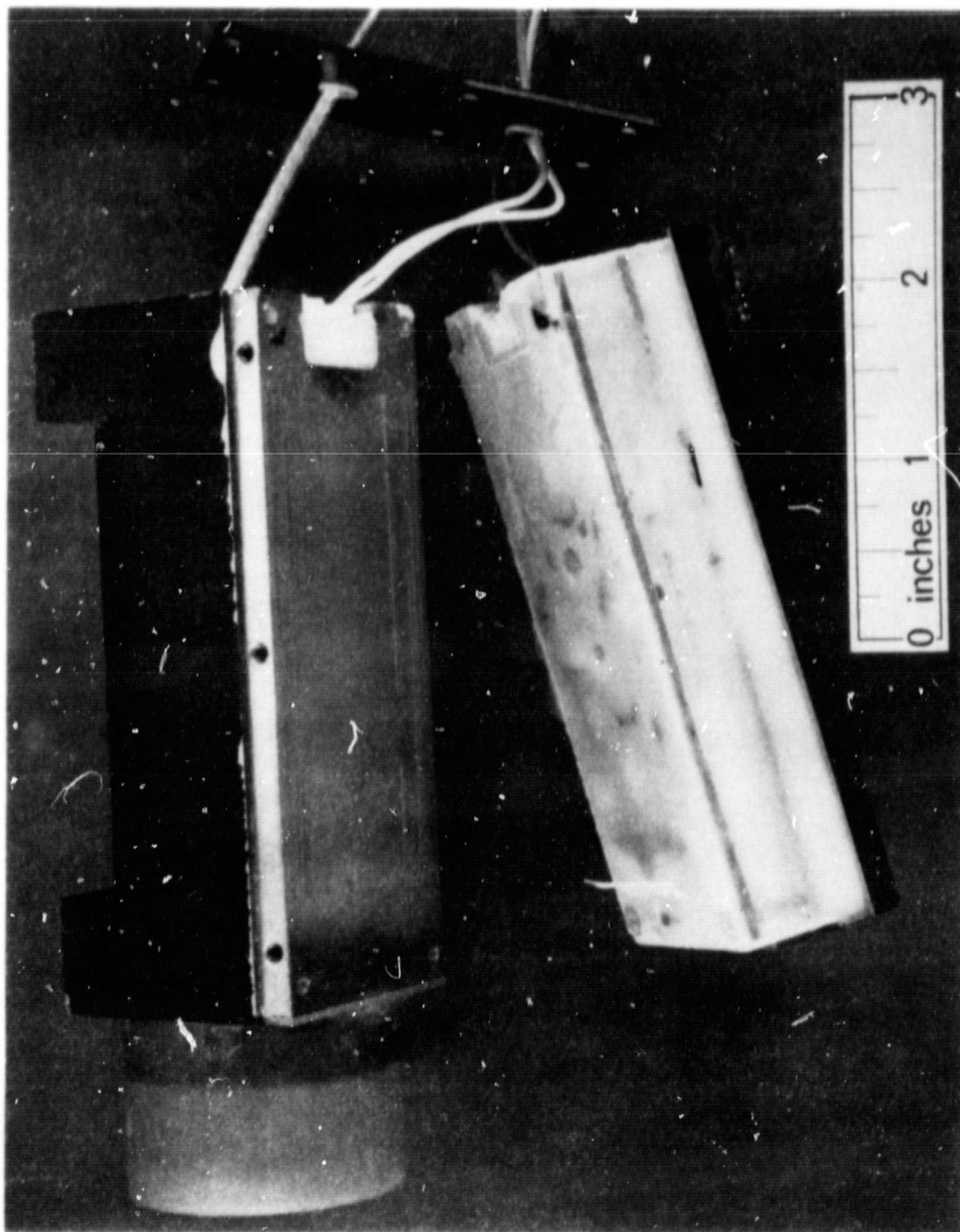


Figure 5-2. GMS IPS S/N 009 Failed Unit Partly Cut Apart

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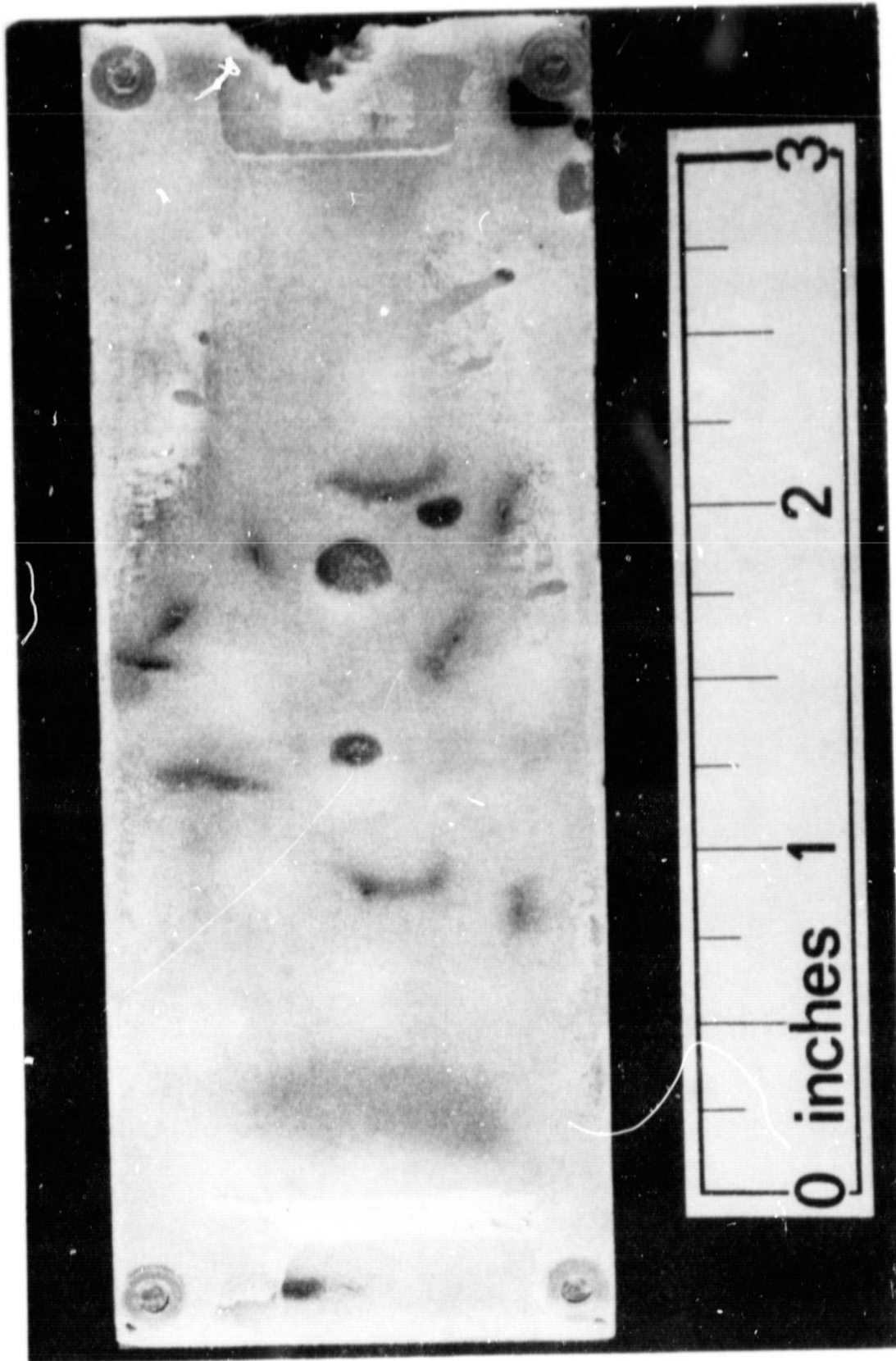


Figure 5-3. GMS IPS S/N 009 Failed Unit - Note Void Lower Right Corner

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Figure 5-4. GMS IPS S/N 009 Failed Unit - Expanded View of Void

The IPS design had been previously developed and qualified during the SMS contract. The second purchase lot of IPS units for GMS, GOES, and VAS were to be manufactured identically to the previous lot with the exception of certain approved changes to manufacturing procedures.

All the existing 52 IPS units purchased in the second lot contain questionable potting in the area of the high-voltage multiplier. Table 5-2 gives a description by instrument and project of the 52 suspect IPS units. In an attempt to establish some type of reliability status for these units, a thermal-vacuum life test was conducted. This test used the seven GOES, three GMS, and one SMS spare units. All units were placed in thermal vacuum at 40°C and 1×10^{-6} torr pressure for a proposed 90-day test. The high-voltage monitor point was recorded continuously for the duration of the test. The anode current and oscillator output waveform were checked twice weekly or when any irregularity occurred on the high-voltage monitor.

Table 2. Distribution of Suspect IPS Units

GMS-1	8	GOES-B	8
GMS-2	8	GOES-C	8
GMS - SPARES	3	GOES-D (VAS)	8
GMS - FAILED	<u>1</u> SN 009	GOES - SPARES	6
	20	GOES - FAILED	1 SN 123
		GOES - BROKEN	<u>1</u> SN 109
			32
TOTAL IPS UNITS PROCURED			
IN THIS MANUFACTURING LOT		<u>52</u>	

As the failure mode is related to the duration of continuous vacuum exposure, the data from the shorter vacuum exposures at the spacecraft level are of questionable value. Regardless of this, the numerical prediction is generally useful in describing the possibilities of an operational failure.

The eleven IPS units currently under test at SBRC have been in thermal vacuum for 2,370 hours as of 22 June 1977. Table 5-3, the thermal-vacuum life test status, gives the serial numbers and history of this test. One malfunction has occurred to date involving the GOES IPS unit, Serial No. 123. This unit had undergone 100 hours of thermal-vacuum testing prior to delivery from EMR, the manufacturer; the failure in the SBRC vacuum test occurred at 575 hours into the test. The failure symptoms were identical to the GMS unit, Serial No. 009, that failed while installed in the GMS spacecraft. Both failures occurred after relatively short vacuum exposures when compared to the total length of the vacuum life test. No additional failures have occurred during the remaining 1800 hours of the test.

Table 5-3. Status of IPS Vacuum Life Test to Date

GOES IPS	<u>SN</u>	<u>SN</u>	
	112	123	
	117	124	TOTAL HOURS TO DATE 2370
	121	133	(22 JUNE 77)
	122		SN 123 FAILED 4/8/77 AFTER
			575 HOURS (FIRST FAILURE
			SYMPTOMS OCCURRED 4/5/77)
GMS IPS	<u>SN</u>	<u>SN</u>	
	004	012	
	011		
SMS IPS	<u>SN</u>		
	37		

Until this latest test series using the eleven spare IPS units, the longest vacuum exposure any of the IPS units had been subjected to was approximately 300 hours. This additional vacuum exposure has provided more substantial

information for generating preliminary reliability statistics. Based on all accumulated test hours to date for GOES, GMS, and spare tubes, approximately 50,292 unit hours of vacuum testing have been conducted. During this period, two IPS units have failed from apparently the same vacuum related potting deficiency. The mean-time-between-failure (MTBF) calculations based on these data give an MTBF of 9400 hours for a single IPS unit at a 90% confidence level.

Admittedly, the test data are still somewhat limited, however, it points to an "infant mortality" failure type for the potting void problem. If this is true, as it appears to be, extended thermal-vacuum testing of at least 1500 hours could effectively screen the incipient failures from each group of IPS units.

Appendix A

DEVELOPMENT OF A SPUTTERED MoS_2 LUBRICATION SYSTEM
FOR THE VISSR/VAS SCAN MIRROR SUPPORT BEARINGS

SANTA BARBARA RESEARCH CENTER

A Subsidiary of Hughes Aircraft Company

75 COROMAR DRIVE, GOLETA, CALIFORNIA

DEVELOPMENT OF A SPUTTERED MoS₂ LUBRICATION SYSTEM FOR THE VISSR/VAS SCAN MIRROR SUPPORT BEARINGS

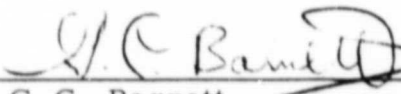
Contract NAS5-21139

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Glen Dale Road
Greenbelt, Maryland 20771

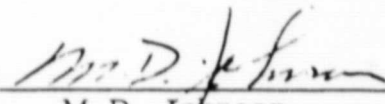
15 August 1976

Prepared by


G. C. Barnett

Reliability Engineering

Approved by


M. D. Johnson

Associate Director
Product Assurance

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- B

 VISSR ENCODER BEARINGS, 4582
- C

 INVESTIGATION OF THE GOES BEARING ASSEMBLY "RUN-IN" TEST FAILURE BY BALL, RACE, AND RETAINER SURFACE ANALYSES

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TRANSFER FILM LUBRICATION EVALUATION

In the VISSR scan mirror drive development phase, a servo system incorporating an optical encoder was selected over a lead screw and stepper motor. The optical encoder's poor tolerance of center shift and the off-center holding torque requirements dictated the use of precision ball bearings over flex pivots. These bearings were required to be large and highly preloaded to support the approximately 38-pound mass of the scan mirror structure with the required precision. A Fafnir AMVW547 WOD MRR DB Torque Tube Bearing was selected for this application.

The original lubrication scheme utilized a Rulon "A" ball cage and a manually burnished MoS₂ film on the raceways and balls. This was decided after oil and greases were rejected for possible outgassing and film creep problems. The Rulon "A" cage provided a teflon transfer film while the burnished MoS₂ formed a temporary wear barrier during run-in.

The VISSR bearing application requires a limited scan motion of $\pm 5^\circ$ about a nominal center point. An absolute mechanical limit exists at $\pm 6.5^\circ$ about the same center. Each of the two bearing pairs is mounted within a precision optical encoder (see Figure 1). These bearings serve the dual purpose of providing a precision mounting for the optical encoder disk and supporting the approximately 38-pound scan mirror structure.

The VISSR/VAS five-year mission requires a minimum of two complete scan frames (pictures) per hour or 87,600 cycles. The scan mirror is stepped in increments of 19.775 arc seconds at a rate of 1.667 steps per second during the forward or "picture taking" scan. It is then retraced using the same step size, but at a rate ten times the forward rate. Each scan and retrace is composed of 1820 steps each or approximately 10° of travel. The bearing ball travel is limited to 5.31° on the inner race and 4.69° on the outer race by this frame size.

As a result of excessive transfer film accumulation within the SMS scan mirror encoder bearings, an attempt was made to replace the Rulon "A" separator with a material having a lower transfer rate. At the recommendation

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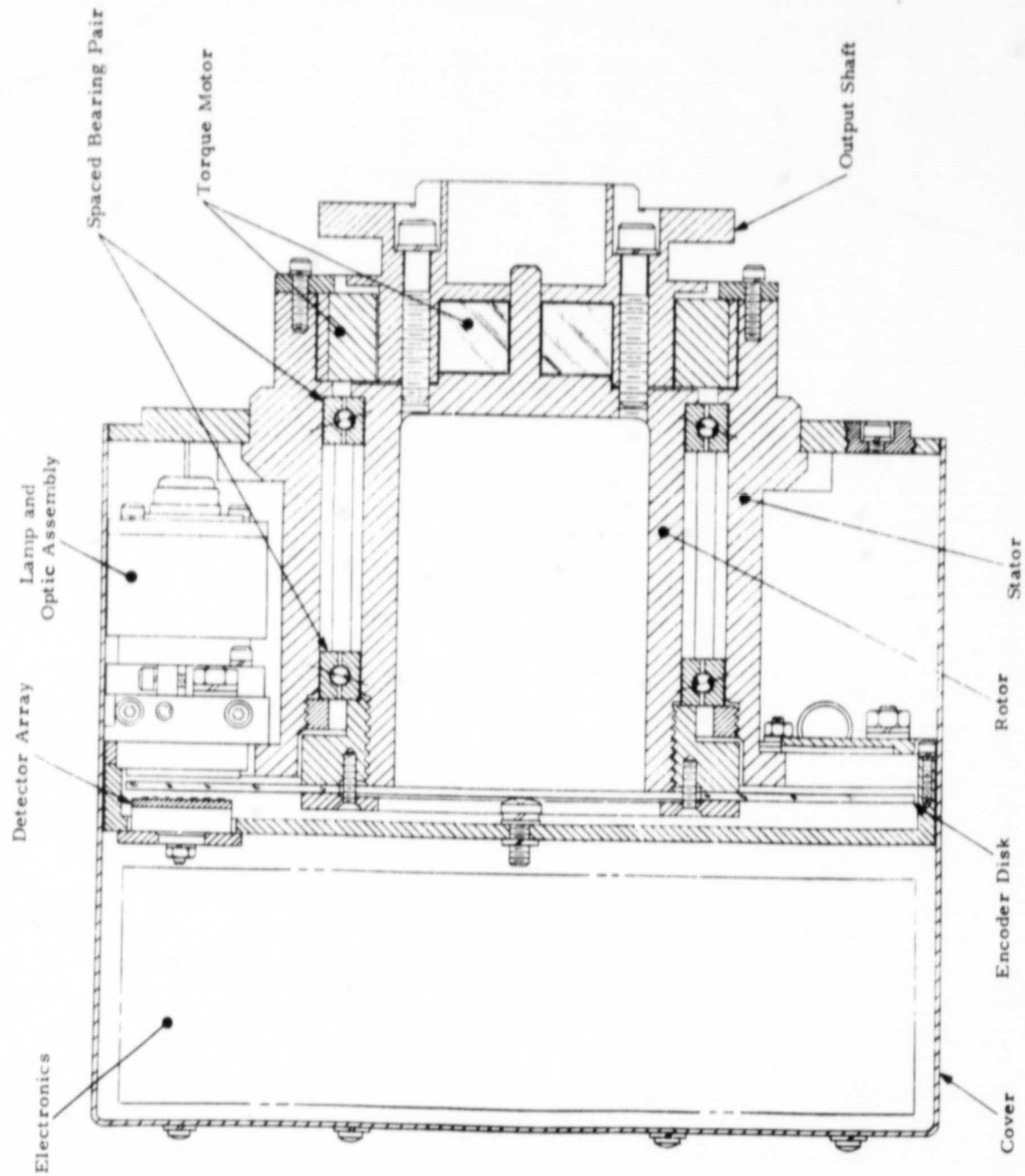


Figure 1. Encoder/Torque Motor/Bearing Cross Section

of the Fafnir Bearing Corporation and several other bearing experts, the GMS and GOES encoder bearings were procured with Meldin P1-30X ball separators. This material was thought to have a lower transfer rate due to its reduced teflon content.

After receipt of the bearings, a vacuum life test was started using bearing SN 029. The bearing was installed in the life test fixture as received without a run-in. The life test procedure is a duplicate of the VISSR scan pattern with the exception that rather than 1820 steps, the fixture uses approximately 600 steps to cover the 10° scan. A times-ten acceleration factor is used to allow the test to be completed in a reasonable time period. Greater acceleration factors are not usable due to the transfer characteristics of the retainer. The results of this test are shown in Figures 2 and 3.

The rolling and static friction of test bearing SN 029 increased only slightly over the 102,000 cycles of the test period. The end-of-scan lubricant buildup started at 2,000 cycles and reached 20 inch-ounces by 12,000 cycles.

The end-of-scan peak buildup at 102,000 cycles reached 50 inch-ounces. At this time the behavior of the Meldin P1-30X ball separator was not significantly different from that of the Rulon "A" material previously tested for the SMS program.

As an outcome of the Meldin bearing tests, an investigation was started into other more suitable lubrication systems. These centered about RF sputter deposited MoS_2 films using various ball cage materials. During discussions held with the encoder manufacturer (Baldwin Electronics), it was discovered that a considerable run-in of the bearings was incurred in the shaft grind and disk centering operations. As Baldwin had been instructed to minimize run-in to prevent excess transfer film buildup this came as a surprise. The run-in totalled approximately 4800 revolutions at 18 rpm, and is an essential part of the manufacturing process. As a result of this information, all subsequent test bearings were given a simulated run-in prior to oscillatory testing in the life test fixture.

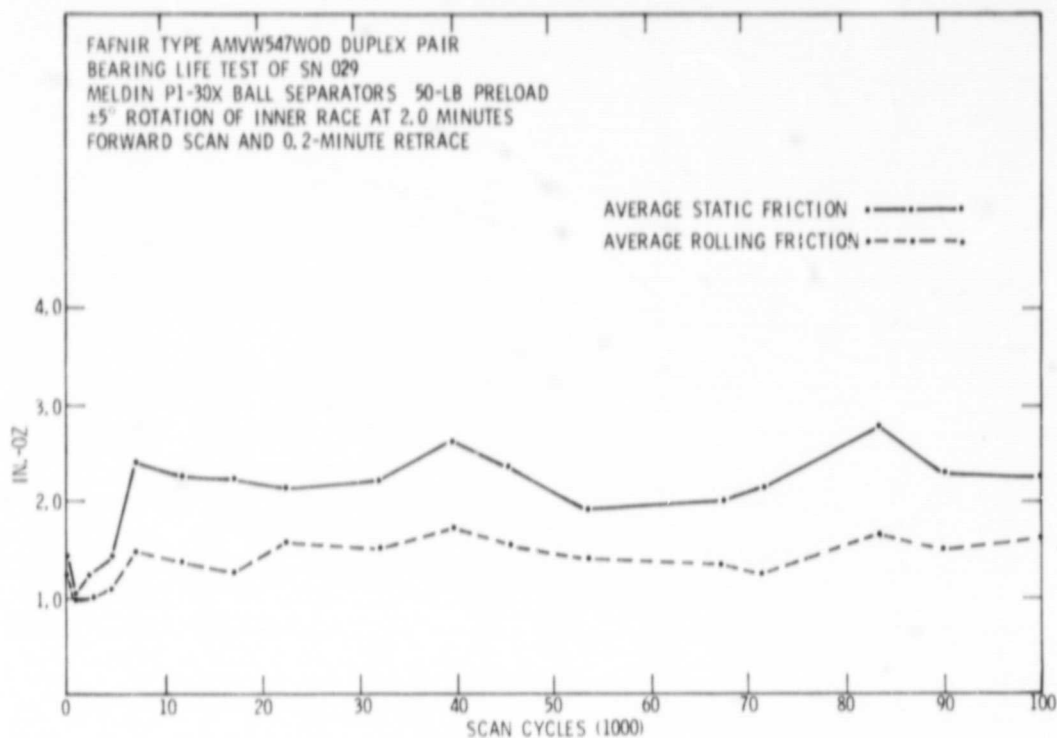


Figure 2. Bearing Life Test of SN 029, Rolling and Static Friction

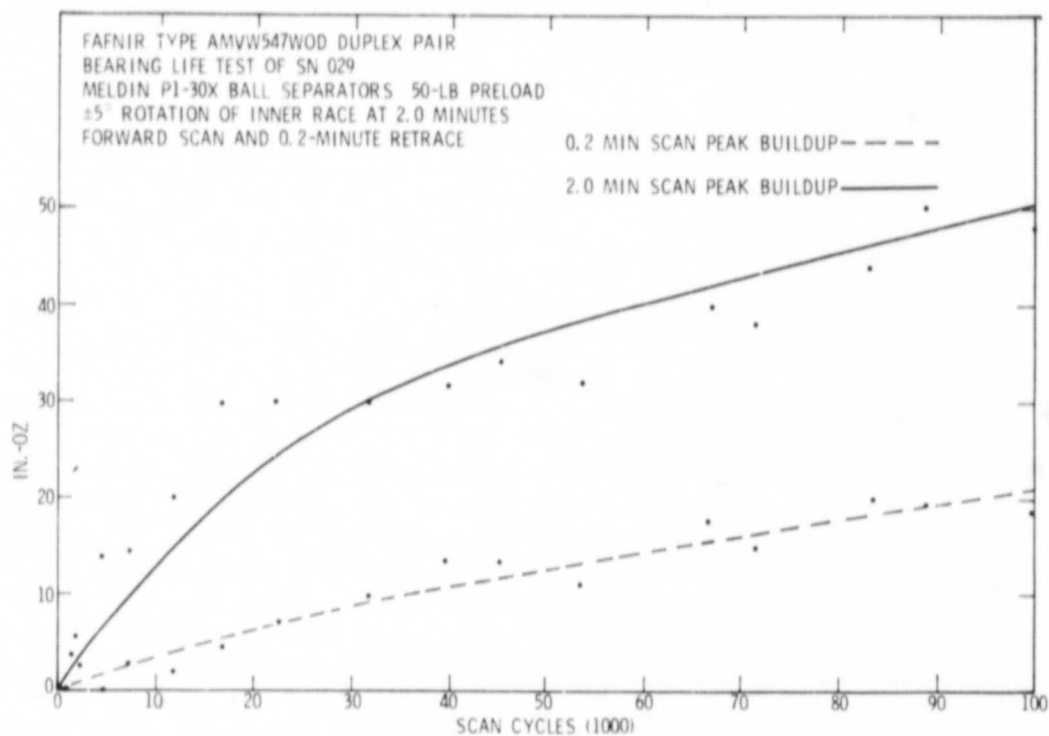


Figure 3. Bearing Life Test of SN 029, End of Scan Peak Torque Buildup

At this time, a second Meldin separated bearing test was started at the urging of CSFC. The test utilized bearing SN 032 borrowed from the GMS program. To more closely simulate the actual test history of an encoder, these bearings were given the 4800-revolution run-in at 10 rpm prior to the start of the test. The initial torque values were comparable with previous tests. The end-of-scan torque buildup began immediately but did not rise as rapidly as before. Static and rolling friction appeared to be normal until approximately 30,000 scan cycles had been completed. After that point the static friction began a rapid rise with peak static friction levels exceeding 20 in-lb by 75,000 cycles. These data are illustrated in Figures 4 and 5.

Photographs of the ball tracks (Figures 6 through 10) show a uniform transfer film was established during the run-in. This was distorted by the oscillating ball motion creating evenly spaced areas of disturbed and undisturbed film. The undisturbed film is smooth and even when examined at up to 30X. The areas of disturbed film, where the oscillating ball tracks appear, are composed of between 30% and 90% bare metal. The remainder is covered with a transfer film of various thickness as indicated by the optical fringe patterns. The "bare" areas may have some coating but it is not apparent when examined optically. The ends of the ball track have obvious accumulations of transfer film debris. This was squeezed into a semi-circle by the contact ellipse. The heights of these accumulations are between 12,000Å and 20,000Å above the bearing surface.

The net force of 72 balls pressing simultaneously against the ramps created by these accumulations is the cause of the end-of-scan torque buildup. The missing transfer film from the ball track areas is either clinging to the balls (this has been observed) or has flaked off the surfaces. The rough texture of the ball-raceway interface created by the partial removal of the transfer film is the cause of the increased rolling and static friction. Photographs of bearing SN 032 in various magnifications are shown in Figures 6 through 10 as examples of the problem.

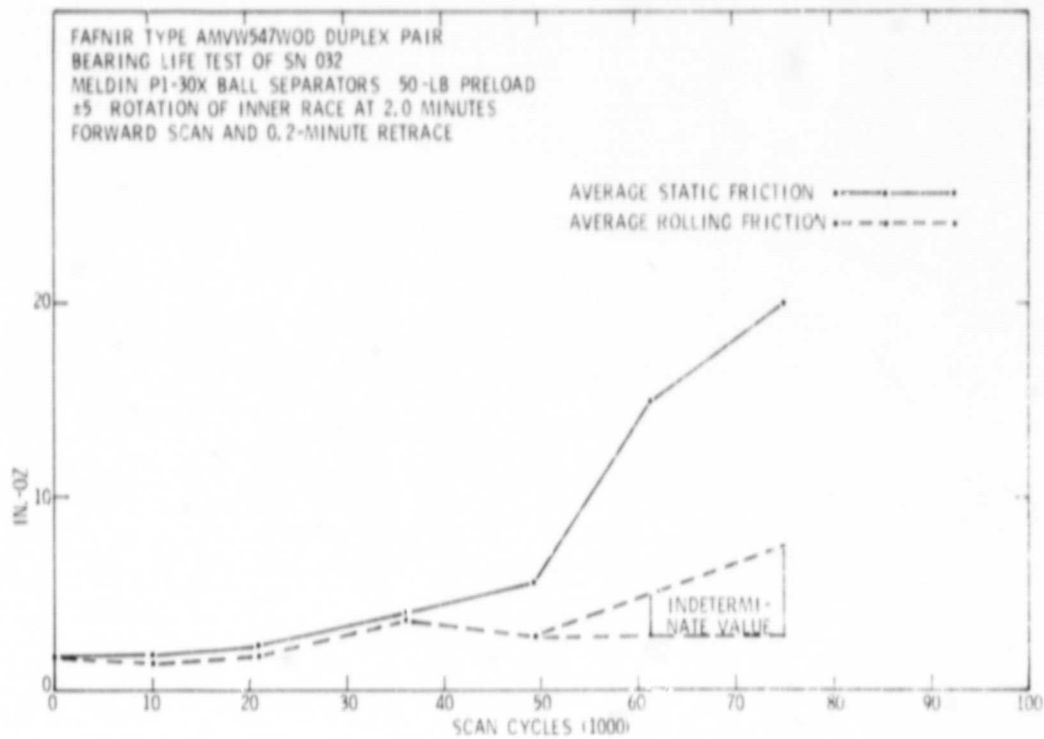


Figure 4. Bearing Life Test of SN 032, Rolling and Static Friction

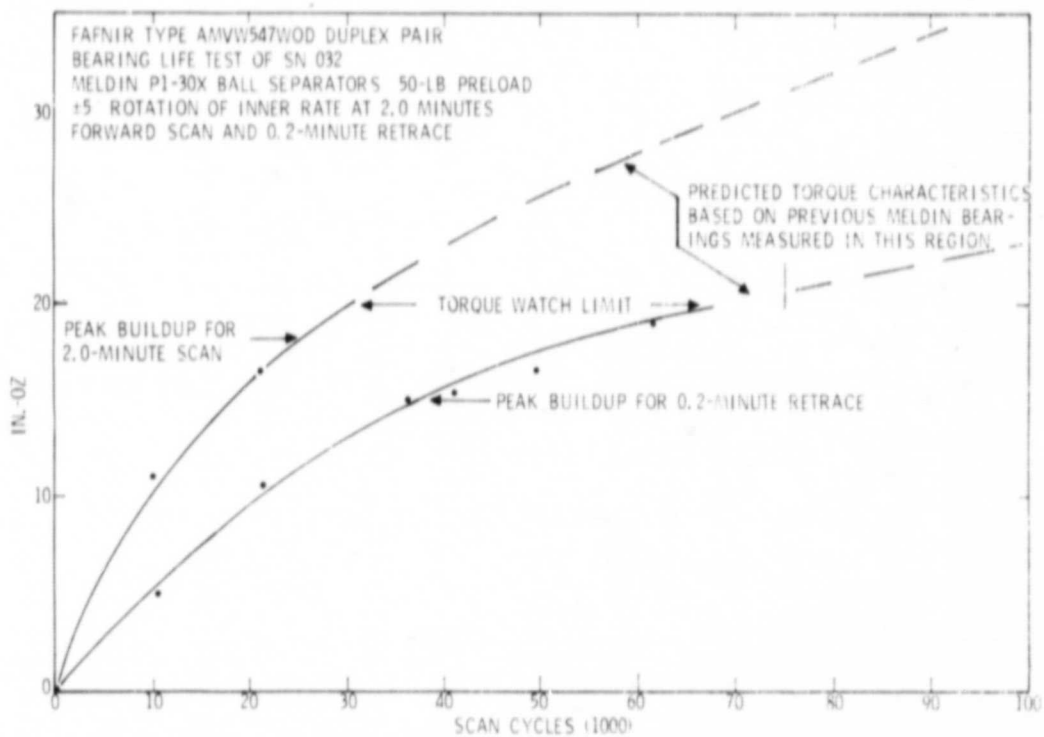
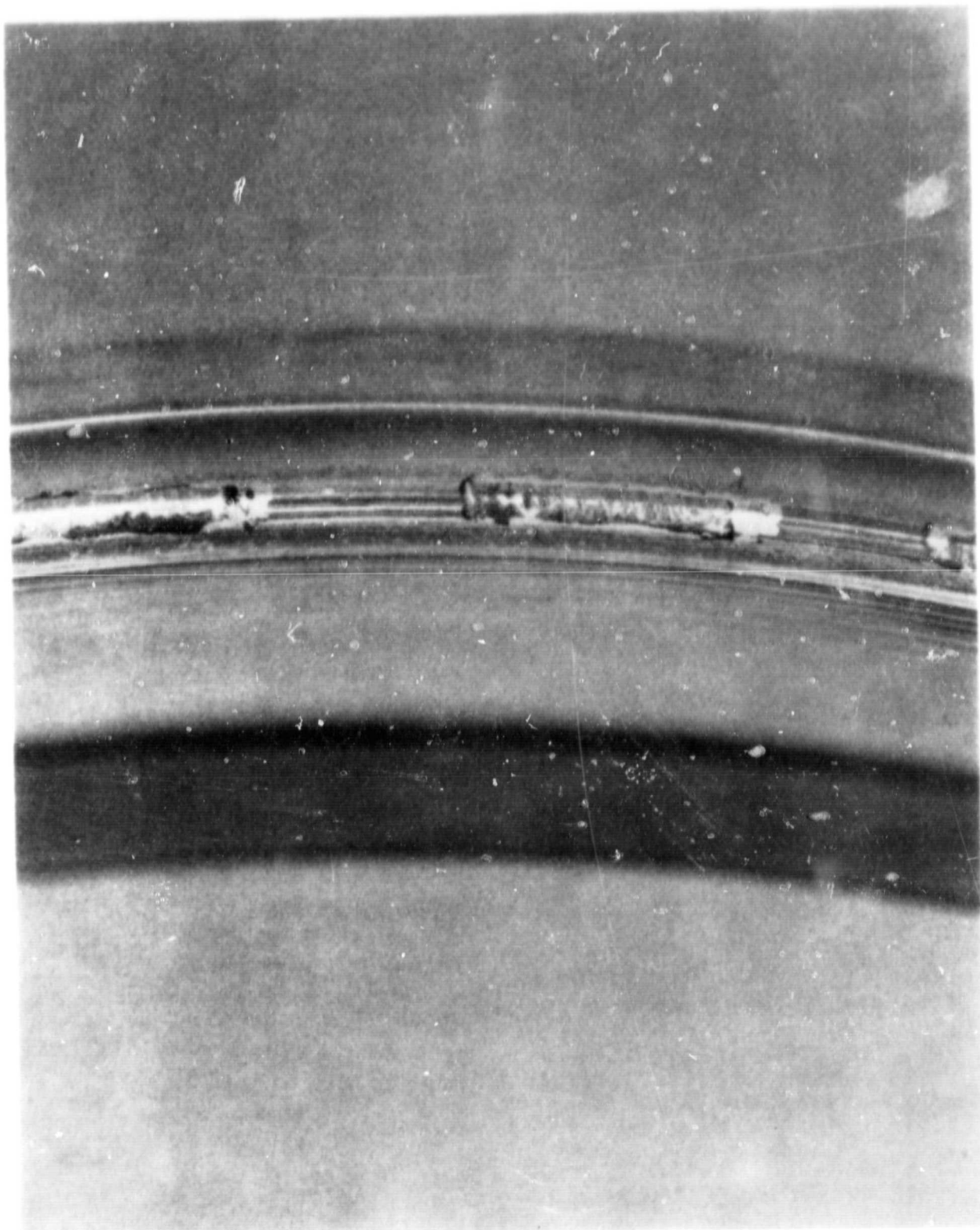


Figure 5. Bearing Life Test of SN 032, End of Scan Peak Torque Buildup



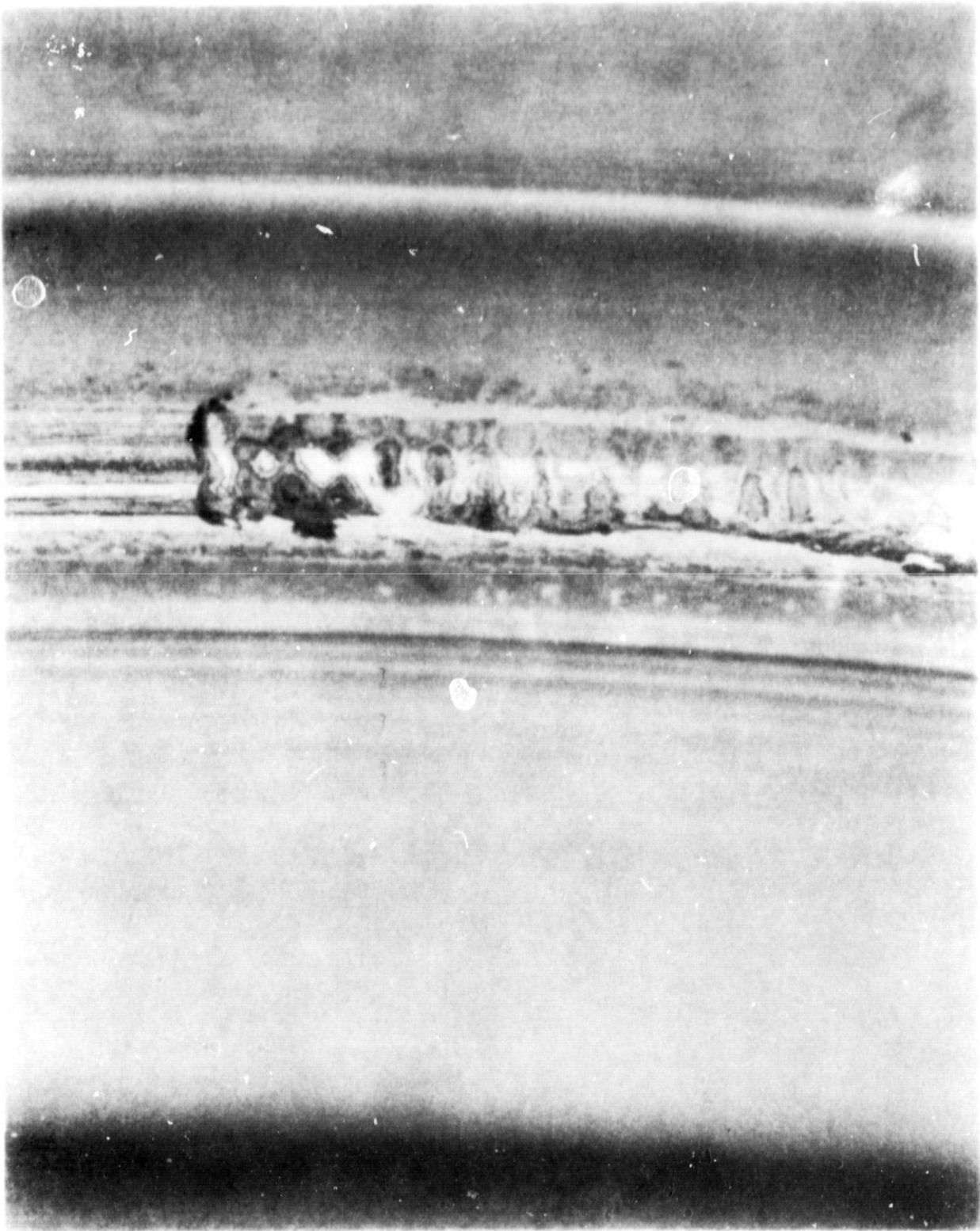
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Figure 6. Bearing SN 032, Inner Race
Ball Track



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Figure 7. Bearing SN 032, Inner Race, Higher Magnification



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Figure 8. Bearing SN 032, Inner Race, Higher Magnification

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SBRC

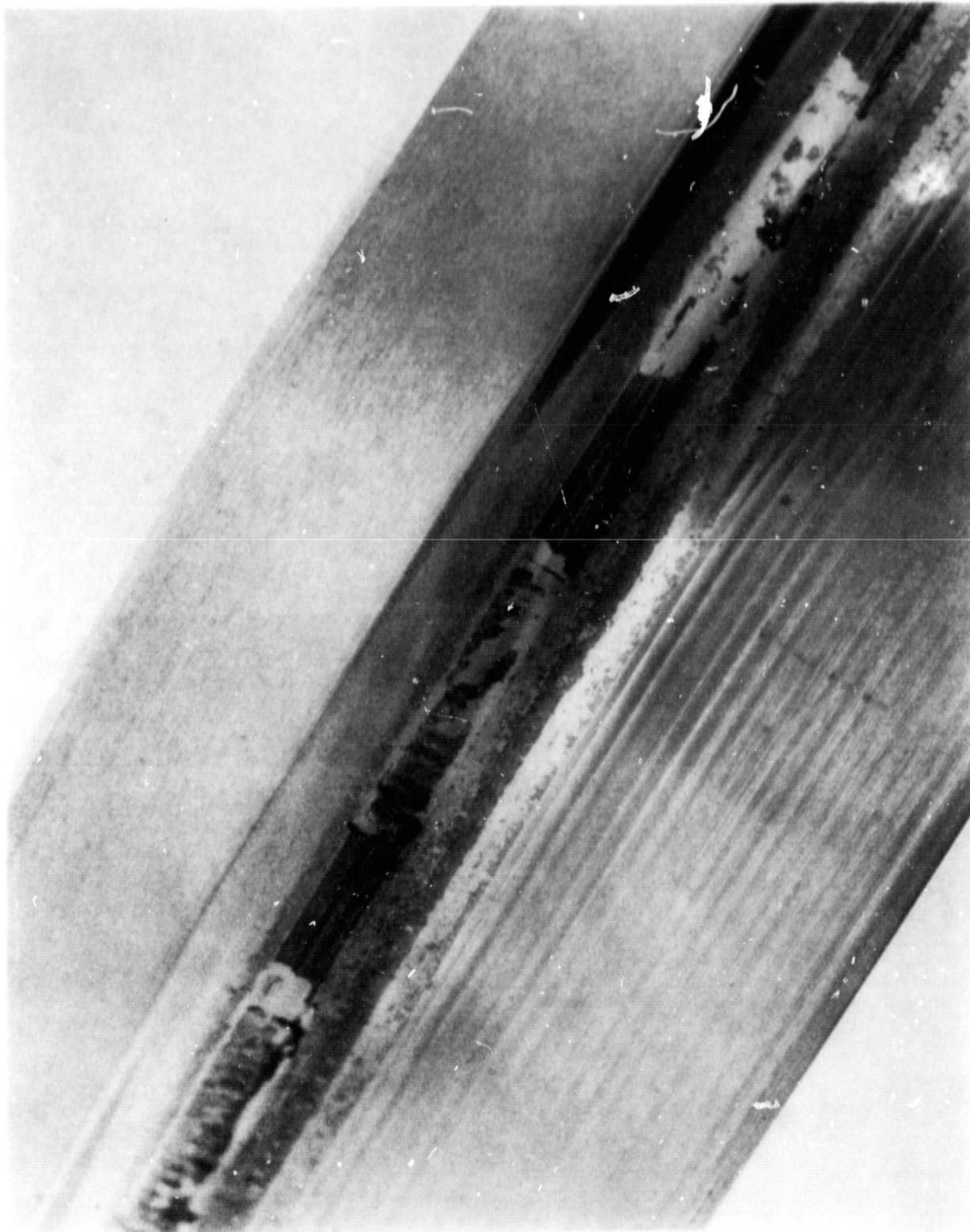


Figure 9. Bearing SN 032, Inner Race, Separate Ball Track

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SBRC

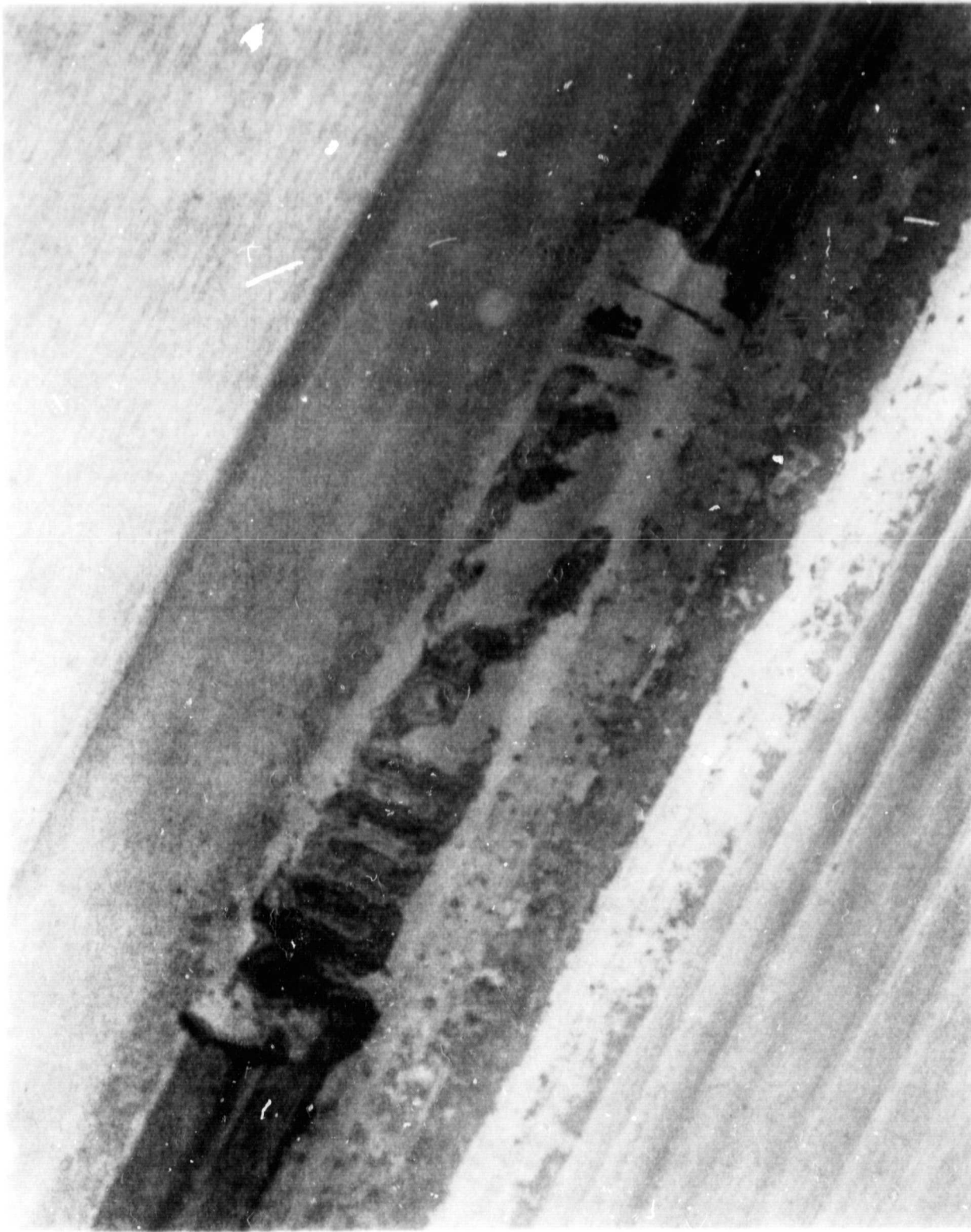


Figure 10. Bearing SN 032. Inner Race, Higher Magnification

76-7-27

The results of these tests show that transfer film lubrication systems are unsuited for applications wherein bearing motion limits or prevents a uniform replenishment of the transfer film. This problem is compounded by a combination of ball spacing and angular motion that prevents the interlocking of the ball tracks. Without this, the end of scan debris created by the balls from the transfer film is not removed by the adjacent balls.

Supporting information is presented in the Appendices. Appendix A describes an examination by Mr. Charles E. Vest (GSFC) of a Rulon "A" separated bearing tested in the ten-times accelerated VISSR fixture. At the time this test took place little was understood about the transfer film phenomenon at SBRC. As a result, some test data points related to the end-of-scan buildups were lost. The bearing used in this test had received no previous run-in, thus was free of a uniformly distributed transfer film. The photographs included in Mr. Vest's report confirm an accumulation of the transfer film at the end-of-scan positions. The region between the ball tracks appears to be nearly free of transfer film. Using a count of the interference pattern fringes, the film appears to be $16,500\text{\AA}$ (3λ) thick in the peak buildup region. The film thickness in the normal ball track region is apparently less than 1400\AA ($1/4\lambda$).

In the GSFC report it should be noted that the same number of fringes appear on either side of the buildup peak. If the buildup were due to the balls wearing or sinking into a previously deposited film, a greater number of fringes would appear on the side toward the ball track. If it is occurring as a result of a continuously deposited film, wherein the film remains very thin ($<1/4\lambda$) in the ball track region, and does not exist beyond the buildup, the fringe pattern will be symmetrical as observed.

A contradiction exists here in that the ball geometry theoretically prevents a direct separator-to-ball, ball-to-raceway transfer. This is explained in the memo of G. K. Hobbs (Appendix B). The transfer does occur as illustrated in the Vest memo; the mechanism is not understood at this time.

A second memo, by H. S. Noji, Hughes El Segundo (Appendix C), involves the analysis of a test bearing SN 007 previously run-in with a Rulon "A" separator by Baldwin Electronics. This resulted in abnormally high rolling and static friction. After this occurrence early in the program, Baldwin was instructed to minimize bearing run-in. The bearing was sent to Fafnir for cleaning and replacement of the Rulon "A" separator with a Meldin separator. When the bearing was reinstalled in the test fixture, it became apparent that the previous transfer film had not been completely removed.

The bearing was then sent to Mr. Noji for analysis to verify this theory. It should be noted that a great similarity exists between this test bearing and the appearance of SN 032.

SPUTTERED MoS₂ LUBRICATION SYSTEMS EVALUATION

During the initial attempts at developing a sputtered MoS₂ lubrication system bearing, SNs 022, 024, 025, 026, and 030 were sent to GSFC who then subcontracted the sputter coating of the raceways to Hohman Plating. Bearing SN 022 was returned to SBRC for vacuum life testing with what is believed to be between 6,000Å and 12,000Å of MoS₂ on the raceways. The balls were uncoated and a phenolic (Synthane LLB-3) ball separator was used.

During the oscillating motion ($\pm 5^\circ$) life test, static and rolling friction remained nominal; however, a significant end-of-scan buildup began within the first 700 cycles. This buildup reached 19 in.-oz by 3000 cycles. Overrunning the buildup ten times on each end-of-scan reduced the peak torque required to less than 7 in.-oz. The test was restarted and by 3789 cycles the peak had returned to 11 in.-oz. The test was suspended while the bearing was given approximately 4000 revolutions at 10 rpm. After restarting the test, the bearing torque characteristics followed the original plot almost exactly, reaching a peak end-of-scan torque in excess of 20 in.-oz by 10,000 cycles. A plot of the worst-case end-of-scan buildup is shown in Figure 11.

The test bearings SN 022 were then disassembled and photographed using a SEM. Due to the large size of the bearing raceways and the limited

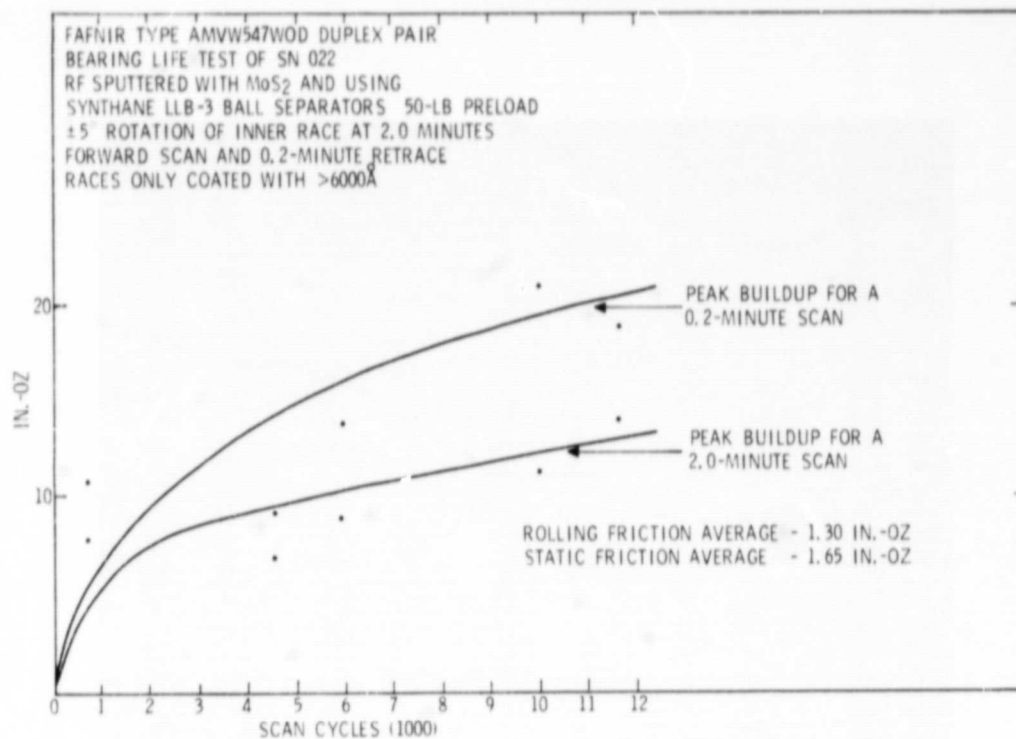


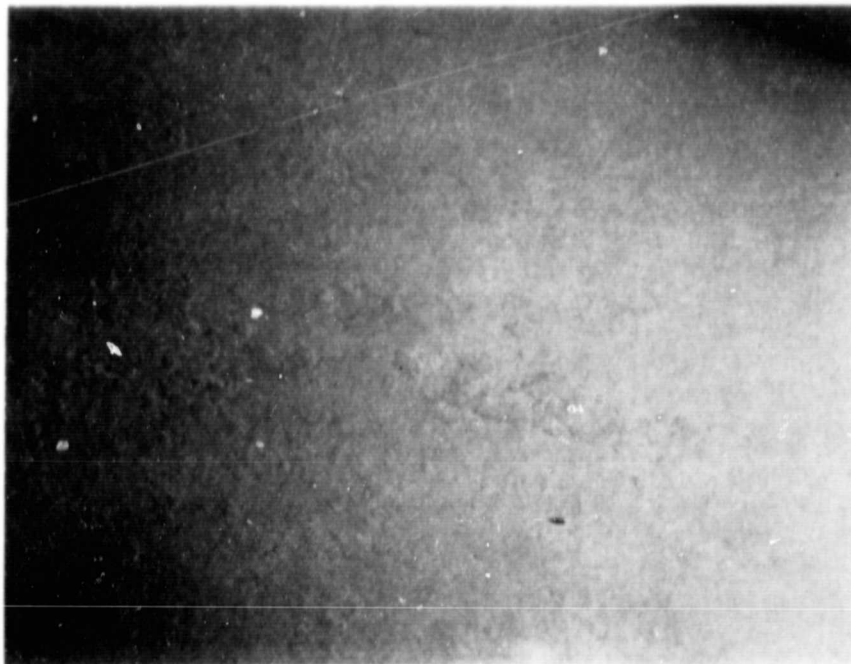
Figure 11. Bearing Life Test, SN 022, End of Scan
Peak Torque Buildup

volume of the SEM chamber, the photographs are confined to a small area of the inner race (see Figures 12 through 15). The photographs illustrate the excessive thickness of the coating and the action of the balls in forcing the material to the sides and into a buildup at the end-of-scan position.

A meeting was held at Fafnir with Mr. Vest (GSFC), Adolph Betterini (Fafnir), and G. Barnett (SBRC) in attendance to examine additional MoS_2 coated bearings and to perform preload and torque tests on them. One of these bearings, SN 030, was then brought to SBRC for life testing. The results of this life test were essentially a repeat of SN 022. A plot of the worst-case end-of-scan buildup is shown in Figure 16.

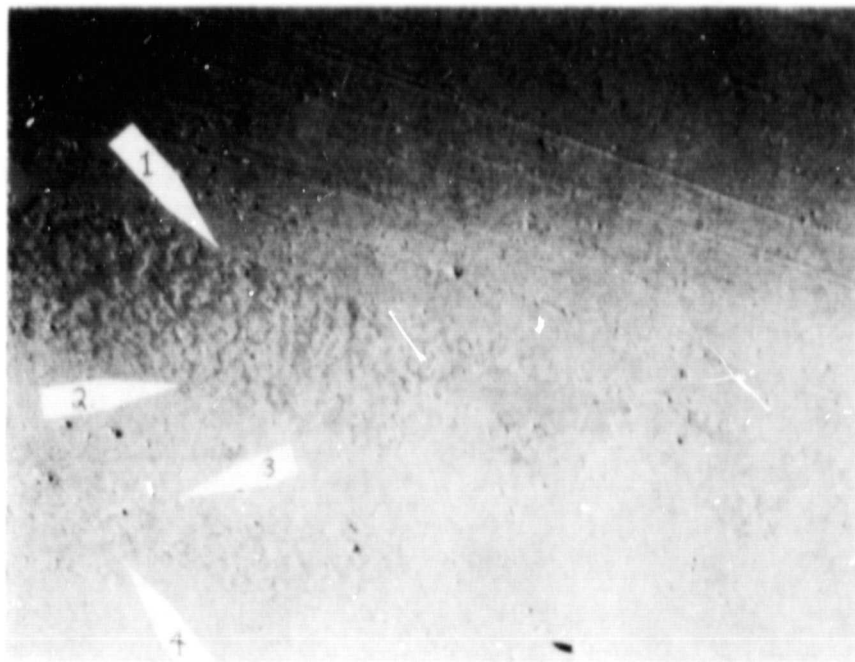
It became apparent through tests of bearings SN 022 and SN 030 that the thickness of the Hohman coatings was in excess of that required by this application. Due to the logistics problems of dealing with an east coast firm, contracts were negotiated with Technology of Materials in Santa Barbara, and Ron Christy of Hughes El Segundo, for development of suitable sputtered MoS_2 coatings.

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The ball was initially uncoated. Some transfer of sputtered MoS₂ has occurred during bearing testing. The MoS₂ appears as splotchy layers of approximately uniform thickness. Two bubble inclusions can be seen in the lower center of the picture.

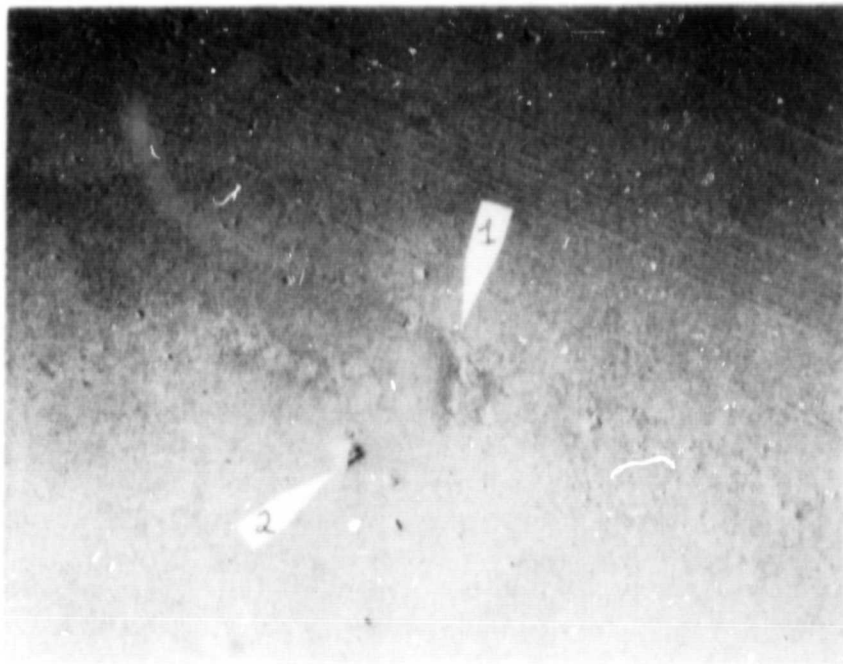
Figure 12. SEM Photograph of a Ball from Fafnir Bearing SN 022
($\times 200$ Magnification)



The region between arrows 1 and 2 is composed of MoS_2 squeezed out of the ball contact ellipse toward the high side of the inner race. The track of the contact ellipse lies between arrows 2 and 3. The low side MoS_2 accumulation lies between arrows 3 and 4. Above arrow 1 is nearly undisturbed MoS_2 replicating the steel surface beneath it. Most of the apparent scratches are in the MoS_2 coating generated by wiping the raceway after-coating in an effort to eliminate excess MoS_2 .

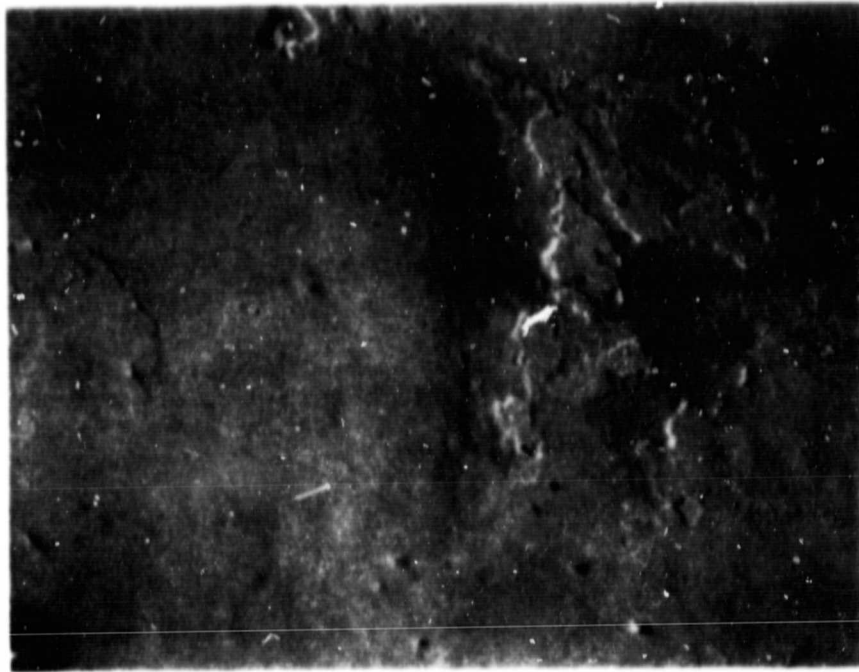
Figure 13. SEM Photograph of Inner Race Ball Track from Fafnir SN 022
($\times 100$ Magnification)

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Arrow 1 points to one of the 144 end-of-scan lubricant accumulations. It should be noted that these appear on the side of the contact ellipse and not directly in front of it. Arrow 2 points to a depression probably caused by grit in the bearing.

Figure 14. SEM Photograph of the Inner Race Ball Track from Fafnir SN 022 ($\times 100$ Magnification)



This is a further enlargement of the previous area showing greater detail. The ball contact ellipse approaches from the upper left, and stops in the center of the photograph. It then retreats toward the upper left. The MoS₂ debris to the right was created during one of the two run-ins the bearing received while in test.

Figure 15. SEM Photograph of the Inner Race Ball Track from Fafnir SN 022 (×500 Magnification)

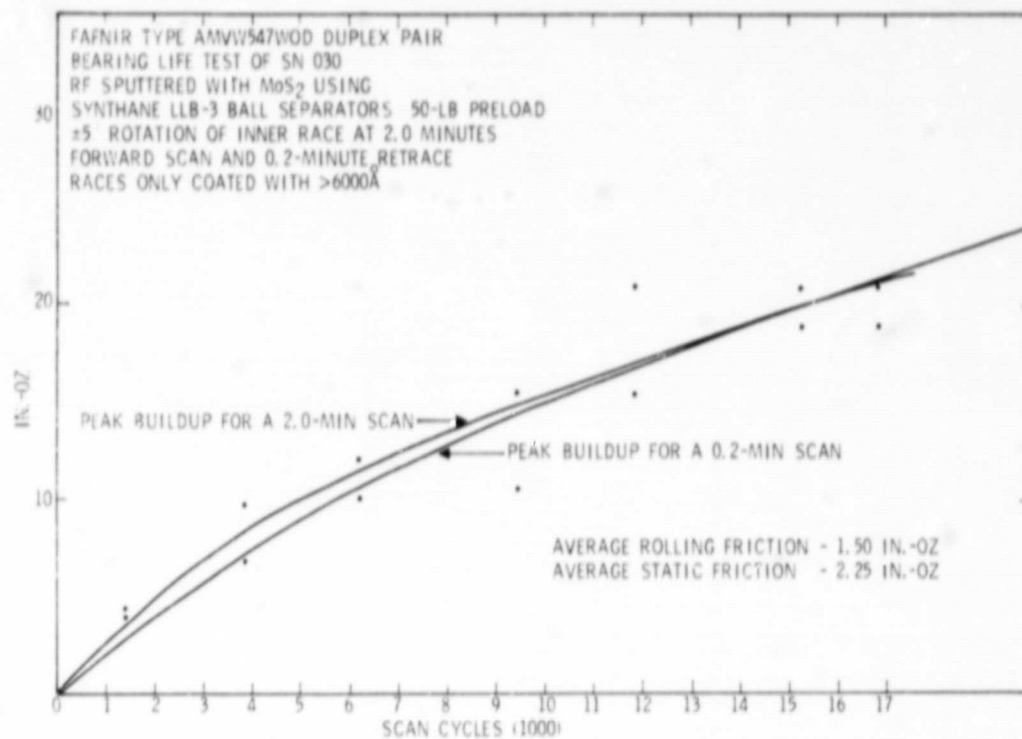


Figure 16. Bearing Life Test 1, SN 030, End of Scan
Peak Torque Buildup

The initial problem was in the development of a process for removal of the existing MoS_2 coating from the available test bearings. This was done by Ron Christy and is documented in SBRC Specification 15869.

The bearings coated by Technology of Materials utilized a hard undercoating of titanium carbide with an overcoating of MoS_2 . The MoS_2 coating of these bearings tended to flake off, causing excessive rolling and static friction. Technology of Materials was eventually dropped as a lubrication source for this particular bearing.

The coatings applied by Ron Christy proved to be durable and reproducible from lot to lot. Initially, several combinations of coating thickness and ball separator material were tried. These included uncoated phenolic separators with coated balls and races; coated bronze separators with coated balls and races; and full complement bearings with coated balls and races. Only the bronze separated bearings proved to be satisfactory for this particular

application. Ball separators of Nitronic 60 steel were fabricated although never tested because of the apparent success of the bronze separators.

A group of commercial bearings were purchased from Split Ball Bearing (SBB) for the initial tests as flight grade Fafnir bearings were unavailable. These gave misleading results due to poor ball size matching. When the SBB bearings were disassembled after life testing, as few as 12 of the 36 balls were found to be carrying the entire load. The end-of-scan torque buildup for these bearings is the sum of the forces necessary to cause each of the 72 balls to climb its own buildup times their average distance from the center of bearing rotation. With the smaller number of balls carrying the entire load, the surface pressure per ball increased. However, due to the finite coating thickness, little increase occurred in the actual end-of-scan torque buildup. This caused the end-of-scan torque buildups to appear smaller for a given coating thickness. As the coating thickness of MoS_2 approached the ball tolerance, the end-of-scan buildup began to rise rapidly.

When flight grade Fafnir bearings became available with their tighter ball tolerances, the thickness previously chosen using the commercial SBB bearings proved to be excessive. Fafnir bearing SN 024 was coated with 2400\AA on the balls and races, and 4500\AA on the bronze separator. The results of its test are shown in Figure 17. Bearing SN 024 was then stripped and recoated with 1000\AA on the balls, races, and separator. The results of subsequent life test of the bearing are shown in Figure 18. When examining this graph, it will be noted that some end-of-scan buildup continues to appear although the thickness decrease from 2400\AA to 1000\AA had a significant effect.

Bearing SN 025 was initially coated with 2400\AA on the raceways and balls, and 4500\AA on the separator. This bearing was then placed in a special fixture for determining if excessive wear would set in after an extended operating period. A 10-cycle per minute rate was used with a sinusoidal scan pattern. The ($\times 200$) acceleration factor makes any comparison of rolling, static or end-of-scan torque buildups nearly meaningless. Figure 19 illustrates the results of this test performed in a dry N_2 chamber. No abnormal wear pattern

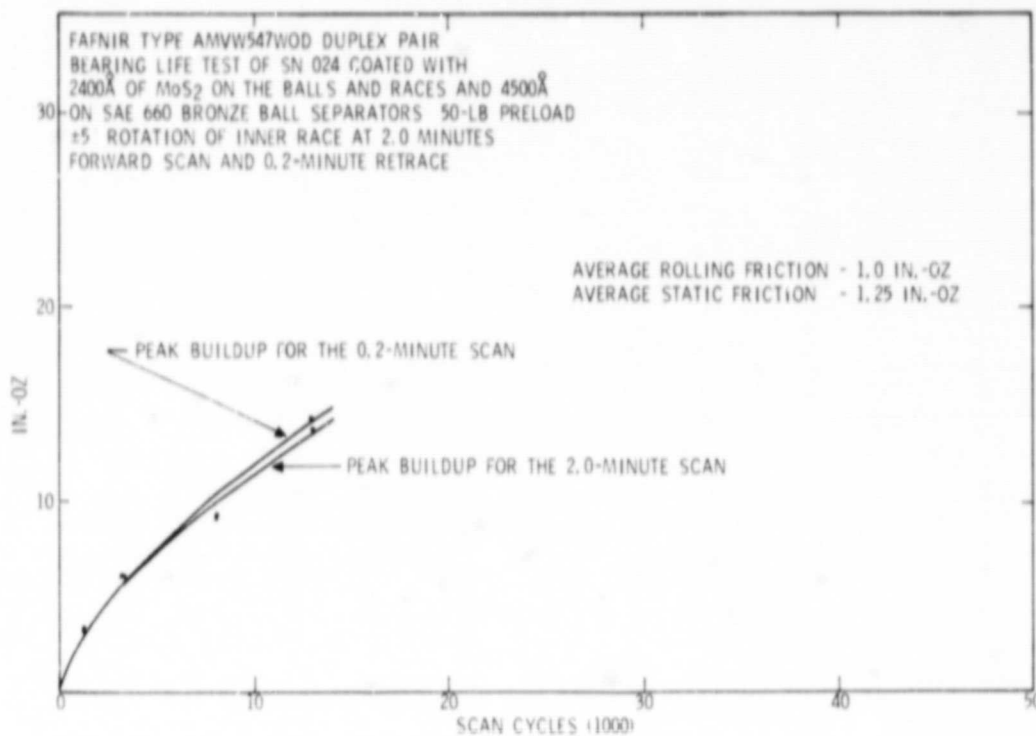


Figure 17. Bearing Life Test 1, SN 024, End of Scan
Peak Torque Buildup

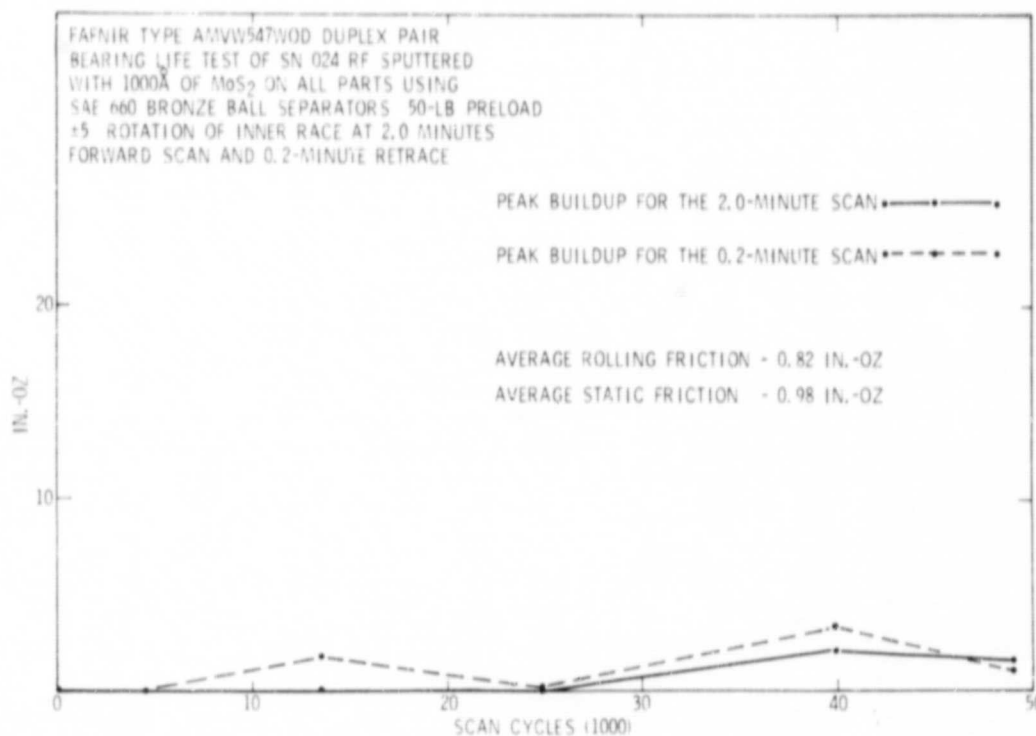


Figure 18. Bearing Life Test 2, SN 024, End of Scan
Peak Torque Buildup

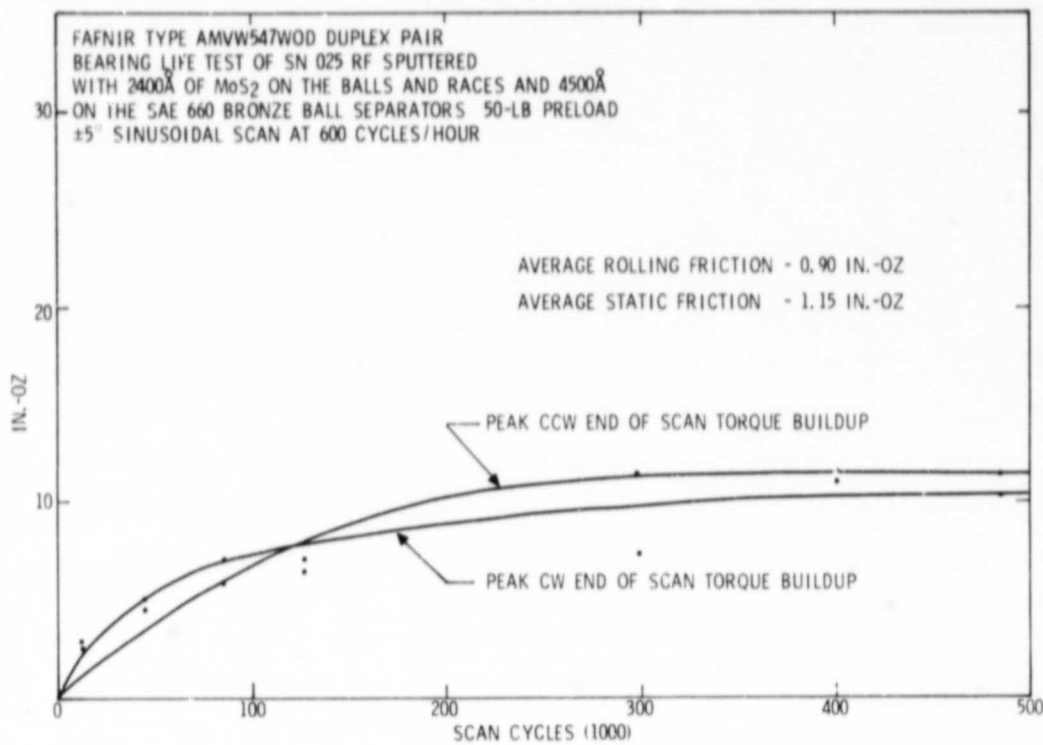


Figure 19. Bearing Life Test 1, SN 025, End of Scan
Peak Torque Buildup

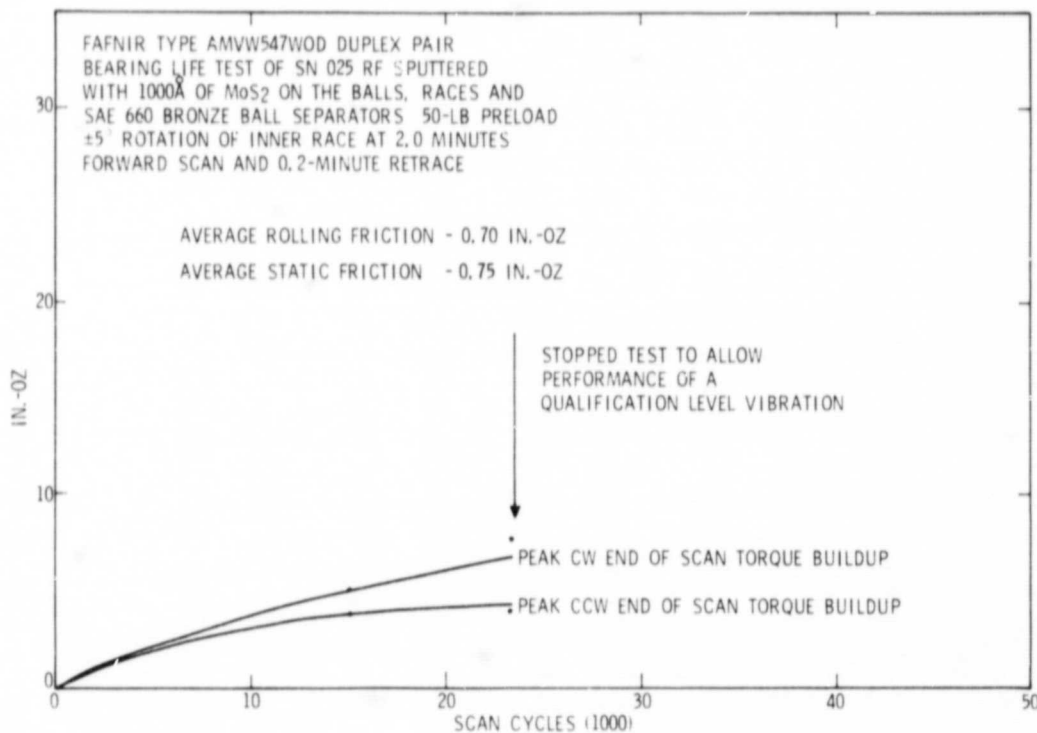


Figure 20. Bearing Life Test 2, SN 025, End of Scan
Peak Torque Buildup

or torque buildups occurred during the test. Visual examination after bearing disassembly showed no mechanical wear. SN 025 was then stripped and re-coated with 1000Å of MoS₂. A second life test of this bearing at the normal (×10) accelerated rate is shown in Figure 20.

Prior to the initial tests of bearings SN 024 and 025 with a 2400Å coating, the GOES "C" (VISSR) encoder bearings SNs 026 and 030 were committed for coating. This action was probably premature; however, based on existing knowledge and the pressure of a schedule slip, it seemed reasonable. After coating with 2400Å to 2800Å and a 4800 revolution run-in, these bearings were placed in the life test fixture.

Table 1 gives the results of the test.

Table 1. Test Results

SN	Scan Cycles	Average Static Friction (in.-oz)	Average Rolling Friction (in.-oz)	Peak Buildups	
				CW (in.-oz)	CCW (in.-oz)
026	0	1.15	0.80	0.00	0.00
026	4,660	0.85	0.75	2.25	3.20
026	6,675	1.25	0.95	2.50	3.85
026	11,505	1.15	0.85	3.00	4.55
030	0	1.80	1.50	0.00	0.00
030	4,660	1.70	1.45	6.0	7.20
030	6,675	1.75	1.45	3.75	6.75
030	11,505	1.80	1.35	7.50	11.60

The obviously high end-of-scan buildup caused the bearings to be re-stripped and coated with 1000Å on the races, balls, and separator. After recoating the bearings were again run-in for 4800 revolutions and placed in the life test fixture. Table 2 gives results of this test. Based on these test results, bearings SN 026 and 030 were released for use in the GOES "C" (VISSR) encoders. Some end-of-scan buildup will occur; however, it should not become a significant factor in their operation. This is borne out by the

Table 2. Test Results

SN	Scan Cycles	Average Static Friction (in.-oz)	Average Rolling Friction (in.-oz)	Peak Buildups	
				CW (in.-oz)	CCW (in.-oz)
026	0	1.30	1.20	0.00	0.00
026	1,200	0.95	0.75	1.75	1.35
026	3,945	1.10	0.90	1.75	1.75
030	0	1.75	1.50	0.00	0.00
030	1,200	1.10	0.85	2.00	2.25
030	3,945	1.10	0.95	1.75	2.50

extended life test of bearings SN 024 and SN 025 after a second coating with 1000Å of MoS₂. The worst-case peak buildup shown in Figures 18 and 20 does not exceed 1.50 in.-oz after 48,000 cycles for SN 024 and 6.40 in.-oz after 14,000 cycles for SN 025. The second bearing (SN 025) apparently has a thicker coating than SN 024. The current coating tolerance as specified in SBRC process specification 15869 is $\pm 200\text{\AA}$. During the period when bearings SN 024, 025, 026, and 030 were coated, the tolerances were held to approximately $\pm 500\text{\AA}$.

After the test results for the second sputter coating of bearings SN 024, 025, 026, and 030 became available, the nominal coating thickness per specification 15869 was reduced to $700\text{\AA} \pm 200\text{\AA}$. Thirteen additional bearing pairs were processed to this specification with each being given a 2400-cycle run-in followed by a 5000-cycle $\pm 5^\circ$ oscillating evaluation of the lubrication coating. The post-test measurements are listed in Table 3.

The end-of-scan buildups for all but two of the thirteen sets are approximately the same as their static friction readings. This can be interpreted to mean that no measurable buildup is occurring. The other two sets, SN 078 and SN 086, appear to have slightly thicker coatings. This would not cause a significant problem in actual operation.

Table 3. Test Measurements

SN	Average Static Friction (in. - oz)	Average Rolling Friction (in. - oz)	End of Scan at 5000 Cycles	
			CW Peak (in. - oz)	CCW Peak (in. - oz)
077	1.0	0.75	1.30	1.25
078	1.20	0.90	2.35	2.25
080	1.40	1.00	0.90	1.85
082	1.25	1.10	1.30	1.50
083	0.95	0.80	1.60	1.45
084	1.25	0.85	1.30	1.40
085	1.40	1.20	1.75	1.25
086	1.15	0.95	3.00	1.30
087	0.90	0.80	1.30	1.10
089	0.95	0.80	1.25	1.90
090	1.20	1.00	1.20	1.55
094	1.20	0.85	1.15	1.65
097	1.40	1.20	1.90	1.65

To fully qualify this lubrication system, a vibration fixture was fabricated simulating the VISSR scan mirror and support structure. After coating with 1000Å, SN 024 and 025 were subjected to the vibration spectrum and levels given in Table 4.

Table 4. Vibration Spectrum and Levels

Spacecraft Axis	Sinusoidal (Log Sweep at 2 oct/min)		Random (90 sec per Axis)	
	Frequency (Hz)	Acceleration (g, 0-peak)	Frequency (Hz)	PSD (g ² /Hz)
Thrust (Z)	5-10	0.60" D. A.	20-40	+9 db/oct
	10-15	3.0	40-70	0.15
	15-21	8.0	70-120	-9 db/oct
	21-600	3.0	120-1000	0.030
			1000-2000	-3 db/oct
			Overall =	7.5g rms
Lateral (X, Y)	5-11	0.95" D. A.	20-40	0.080
	11-50	6.0	40-64	-6 db/oct
	50-330	1.0	64-1000	0.030
	330-600	1.5	1000-2000	-3 db/oct
			Overall =	7.1g rms

Prior to the vibration tests, SN 024 had received 48,000 cycles of operation and SN 025, 14,000 cycles. The previbration data are shown in Figures 18 and 20. A post-vibration examination of the bearings while installed in the preload fixtures revealed a small amount of black powder on the shaft outside of the bearings. This is thought to be MoS₂ powder dislodged from the coated surface of the ball separator. This was borne out by the increase in end-of-scan buildup during the post-vibration life test shown in Figures 21 and 22. This additional end-of-scan buildup is most likely due to the powder rolling out of the ball track and increasing the normal end-of-scan buildup.

As the result of a test drive failure, the post-vibration life test was stopped and restarted after 53,250 cycles. To restart the test in a new fixture without the problem of misaligned end-of-scan buildup debris, the bearings were given a 50-revolution run-in. This short run-in caused the previous end-of-scan buildups to completely disappear. In the continuation of this test, the end-of-scan buildups reformed at approximately the initial rate. The data from this life test are shown in Figures 21 and 22.

SUMMARY

In summary, the tests performed to date verify the satisfactory operation of a thin sputtered MoS₂ lubrication system. The tests also confirm the unsuitability of transfer lubrication systems for this particular application. Both systems have applications for which they are eminently suited, and conversely other applications in which they would fail to perform satisfactorily. If the information and processes in this report are to be used, they should be thoroughly tested in the particular application in question. Very subtle differences in bearing configuration, environment, or operating procedures can generate serious problems.

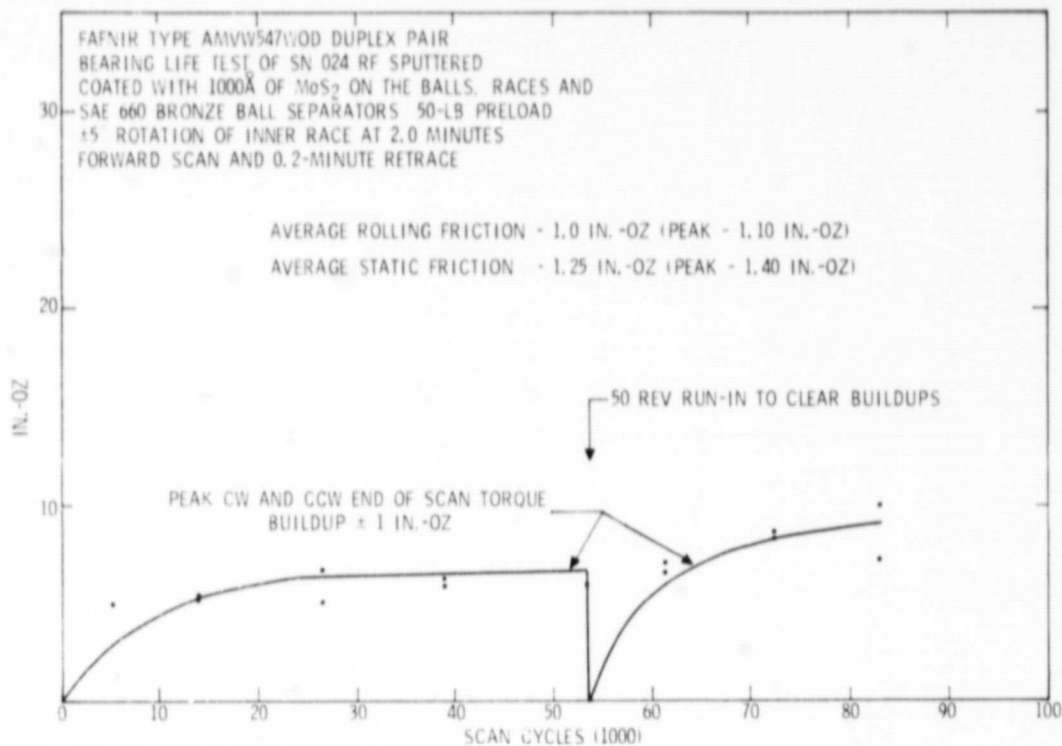


Figure 21. Bearing Life Test 3, SN 024, End of Scan
Peak Torque Buildup (Post Vibration)

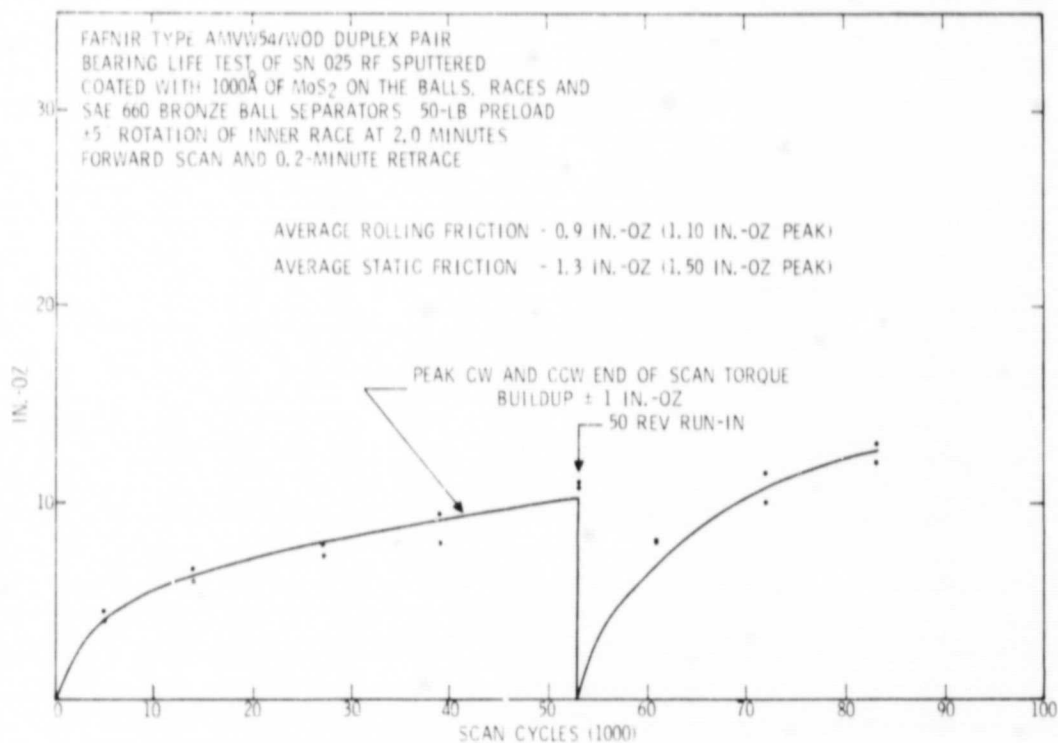


Figure 22. Bearing Life Test 3, SN 025, End of Scan
Peak Torque Buildup (Post Vibration)

Appendix A

EXAMINATION OF THE SMS VISSR
SCAN MIRROR LIFE TEST BEARINGS

UNITED STATES GOVERNMENT

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Memorandum

TO : Mr. James Phenix, Code 731

DATE: February 9, 1973

FROM : Mr. Charles E. Vest, Code 764
Materials Engineering Branch

SUBJECT: Examination of the SMS VISSR Scan Mirror Life Test Bearings

REFER: SBRC Reliability Summary for the Final Design Review (10/17/72).

Introduction

The subject duplex pair of bearings were received for examination from the Santa Barbara Research Center (SBRC) installed in their test fixture (Figure 1) after having operated in a life test for 88,000 cycles (> 3 years of operational lifetime) in a vacuum of 10^{-6} torr, at 35°C , and in an oscillatory motion of 10° clockwise and 10° counter clockwise while under a 45-lb preload. The lubricant was burnished MoS_2 on the races and balls. In addition, a Rulon A + MoS_2 composite ball retainer was used to provide transfer lubrication. SBRC states that this lubrication technique is acceptable, as the test results showed that the static friction increased from 1.0 to only 1.8 oz.in. over the test period. Because they detected a "detent" at each end of the 10° sweep by manual feel, they would like to use only the burnished MoS_2 film and eliminate the teflon-type Rulon retainer.

Bearing Examination

Torque measurements were made while the bearings were still installed in the test fixture (45 lb. axial load), and the results were as follows:

Between the $+10^{\circ}$ and -10° detents, 1.5 oz. in.
 $+10^{\circ}$ toward 0° , 3.8 oz. in.
 -10° toward 0° , 5.5 oz. in.
 0° toward -10° , 3.8 oz. in.
 0° toward $+10^{\circ}$, 5.5 oz. in.

The detents were mentioned in the referenced report and are shown in later photographs.

The bearings were removed from the fixture (Figure 1) and were disassembled, and each component was examined at various magnifications. Figure 2 pictures a closeup of the bearing and of one of the Rulon A fully machined retainers. It is obvious that the retainers were guided on the outer race land. Very little wear of the retainers at this land contact area or even in the ball pockets was evident.



Figure 3 shows a sample bearing ball at 13X and two views of the ball surface at 200X. The ball is bright and shiny (like a new ball) with a few small spots of lubricant film. This appearance suggests that the limited movement did not transfer any significant amount of teflon from the retainers and that very little MoS_2 was burnished onto the balls. The top right photograph shows that the ball has a patchy film and a line of heavier spots of the transferred material. The top left photograph shows that a vague film is present as indicated by the scratches put in the film by a sharp probe. The film appears to be thin and generally uniform (except for the above mentioned spots) and appears to be composed of the transferred Rulon and the burnished MoS_2 powders.

Figure 4 shows the lubricating film on the outer race and the ball tracks therein. The ball tracks are in segments; one wherever a ball has oscillated. The ball tracks did not overlap.

Figure 5 shows the lubricating film on the inner race where the balls have oscillated (36 areas) and also shows that the distance of oscillation was not sufficient to allow balls to rotate into each other's track. The 200X photographs of a ball track show areas with thick and thin transferred film. Figure 6 shows three sections of the lubricating film, illustrating the plus and minus ends and the middle section of the ball track. The build-up at each end is seen in the top and bottom photographs (dark gray areas). The center photographs show the middle of the ball track where a detent was formed during the test and where the film is very thin with a thicker build-up on the ball track edge. This build-up could be retransferred by ball spin and slip back into the ball track, thereby replenishing the lubricant. The darker deposits are probably made up partly of the burnished MoS_2 powders and the transferred Rulon (PTFE).

In Figure 7 are shown two areas of the ball groove of the inner race showing variations in the amount of MoS_2 that was burnished onto the surface. It is understood that the burnishing method used employed a cotton swab and manual pressure in a process that was not designed for use on bearings that are to operate more than a few cycles.

Discussion

The following sketch illustrates my concept of the transferred film condition under a ball path.

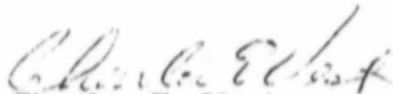


From the sketch and the photographs in Figure 6, it appears that the ball action has transferred a film from the Rulon A retainer to the ball path and that the film has mixed with the burnished MoS_2 . Also, it appears that the ball has pushed the film along the sides and to each end of its track where the film has formed a pile up. This action probably has created the detent at each end and is only detectable when the bearing is rotated by hand past the pile up. In actual operation the detents would not be noticed as the balls would always travel the same distance in the same track without climbing over the pile up.

Conclusions and Recommendations

It is concluded from this examination that the lubricating technique used, although not thorough, was satisfactory for this undemanding application as shown by the test bearings which had operated more than the design lifetime of the VISSR scan mirror and with the final torque values being well within the capability of the drive motor. From the lack of visible burnished MoS_2 on the balls and from the evidence of incomplete film of burnished MoS_2 on the races, it is concluded that the burnished film would be inadequate to provide sufficient lubrication without the transferred teflon material from the retainer. Therefore, it is recommended for the next encoder's bearings that a more complete MoS_2 film be applied by burnishing or sputtering, and that the Rulon retainer still

be used and that the bearings be run-in several thousand revolutions before assembly into the encoder in order to transfer a film of teflon to the balls (see MEB transfer film run-in procedure). It is also recommended that the operation of the bearings in an air environment be kept at a minimum.


Charles E. Vest

cc: H. Frankel
M. Schach
Branch Heads
Section Heads
R. Dorrell
D. Fordyce
P. Burr
R. Marriott
J. Evans

Attachments: (7) Figures

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Figure 3. Three photographs of a ball showing the transferred film. The bottom view (13X) shows that the ball is still quite clean and bright and with a few small areas of transferred film. The top two photographs show the ball surface at 200X; left view shows scratches in the film (made with a sharp instrument) and some black speckled MoS_2 , the right view shows a band of thicker transferred film and MoS_2 .

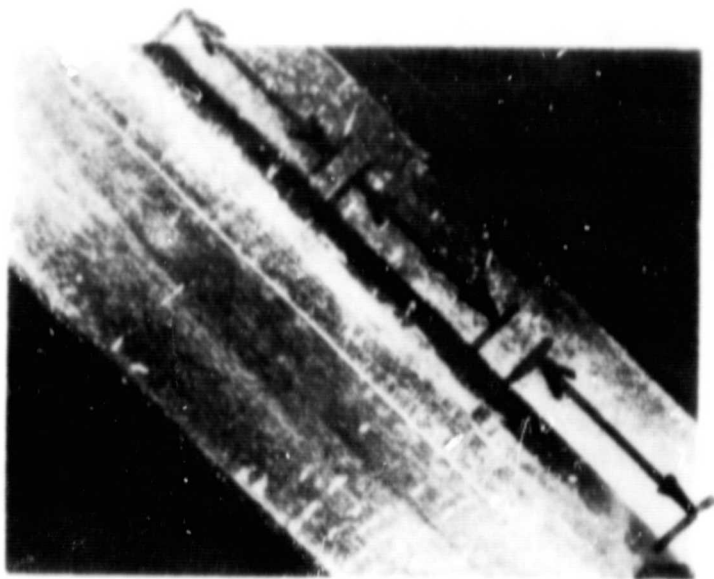
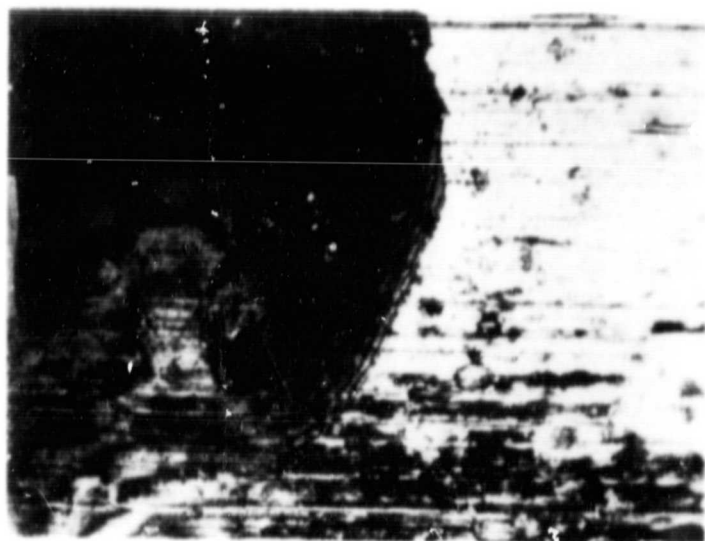
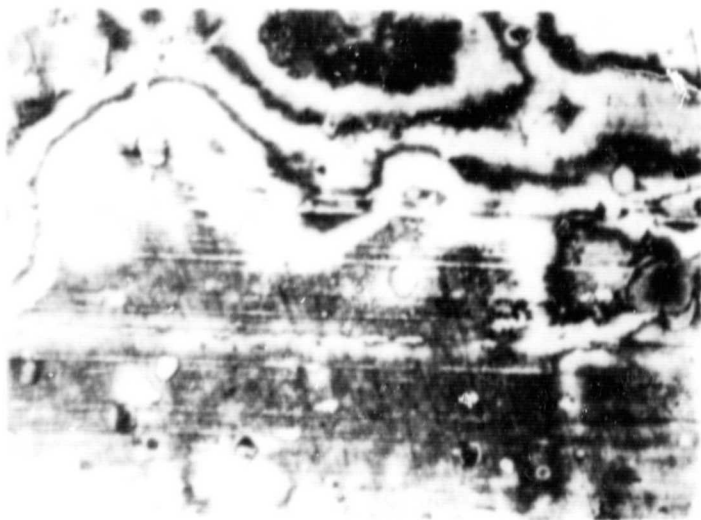


Figure 5.

Inner race ball groove with
separate ball tracks indicated
by arrows.
5.5X.



Dark mass is heavy
accumulation of trans-
ferred teflon-MoS₂
material at the end
of a ball track.
200X.



Fringe pattern of thin
transferred film in the
center region of a ball
track.
200X.



Figure 6.

Three photographs (200X) of sections of the transferred film in the inner race ball track. The top and bottom photos show the buildup at each end of the ball's travel, and the center photo shows the middle of the ball's track. The film from the middle to both the plus and minus directions becomes thicker, but is still thin. The clear middle section (X) probably has a very thin transferred film that is difficult to discern.



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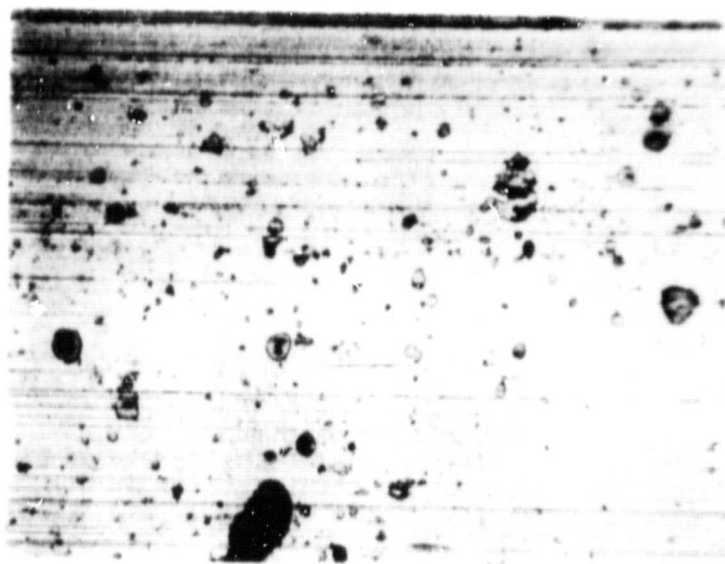
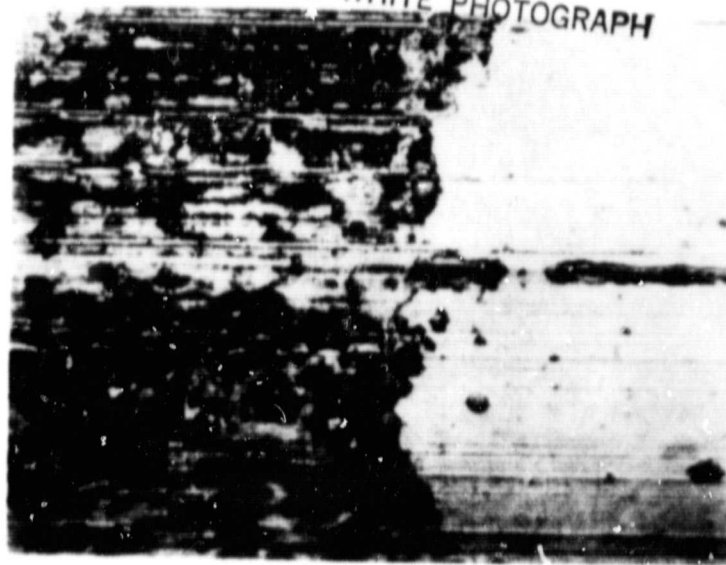


Figure 7.

Two areas of the ball groove of the inner race. Top photo pictures burnished MoS₂ film on left (dark area) between ball tracks. Lower photo pictures ball groove near the land with only spotty MoS₂ burnished film. Both photos are 200X.

Appendix B

VISSR ENCODER BEARINGS, 4582

SANTA BARBARA RESEARCH CENTER

A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO: G. Barnett ✓

CC: T. Abbott
G. Bunson
M. Johnson
J. Reed
R. Thomsen
A. Trantow
S. Guy
S. Hohner

DATE: 12 March 1975
GMS File No. 0369
GOES File No. 0595
VAS File No. 0268
FROM: G. K. Hobbs

SUBJECT: VISSR Encoder
Bearings, 4582

BLDG. MAIL STA.
EXT.

Re: Ball and Roller Bearing Engineering, Arvin Palmgren, 3rd Ed.,
Burbank & Co. Phil., 1959.

Since the VISSR Encoder bearing balls do not normally run on the complete inner and outer races due to the limited scan angle, retainer transfer onto the races tends to build up at the end of scan positions of the balls. It is therefore desirable to know how much the shaft must be rotated in order to roll the balls on all of the races.

The equations for angular contact bearing motions from the reference were used to determine the encoder shaft rotation required in order to move a ball to the position of the next ball, considering both the inner and outer race contact points. The equations used were based on a fixed outer race and unit rotation of the inner race. The required motion was then simply found by noting that the balls are spaced 10 degrees apart. The equations are

$$\theta_{\text{cage wrt outer race}} = \theta_c = .5(1 - \frac{D_w}{d_m} \cos \alpha)$$

$$\theta_{\text{balls wrt inner race}} = \theta_b = -.5(1 + \frac{D_w}{d_m} \cos \alpha)$$

where D_w = ball diameter = 3/16 inch

d_m = bearing pitch diameter = 2.897 in.

α = contact angle = 17°

$$\theta_c = .469$$

$$\theta_b = -.531$$

So for an inner race rotation of 1°, the balls travel .469° ahead on the outer race and .531° back on the inner race as measured on the inner race. Therefore, in order to obtain a 10° motion on the outer and inner race respectively requires 21.3° and 18.8° rotation of the inner race.

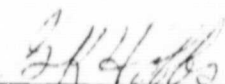
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G. Barnett

-2-

12 March 1975

If a full ball complement were to be used, then the rotations could be reduced to 15.8° and 13.9° for complete ball motion on the outer and inner races respectively.



G. K. Hobbs

GKH:mm

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Appendix C

INVESTIGATION OF THE GOES BEARING ASSEMBLY
"RUN-IN" TEST FAILURE BY BALL, RACE, AND
RETAINER SURFACE ANALYSES

HUGHES

INTERDEPARTMENTAL CORRESPONDENCE



PA 7929 nehm 2/2/74

TO: G. C. Barnett cc: (See Distribution) DATE: 22 November 1974
ORG: SBRC REF. 2717.32/245

SUBJECT: Investigation of the GOES Bearing Assembly FROM: H. S. Noji
 "Run-In" Test Failure by Ball, Race, and ORG. 27-17-32
 Retainer Surface Analyses

BLDG. 6 MAIL STA. D133
LOC. CC EXT. 6623

I. INTRODUCTION:

During the GOES self-lubricated bearing "run-in" test operation at Santa Barbara Research Center, high torques developed by one of the bearing assemblies. It was suspected that this was probably caused by excessive and rapid lubricant transfer film build-up on the bearing race ball paths.

In order to determine the possible cause of this "run-in" anomaly, the subject bearing assembly was disassembled and submitted to this activity for examination. The bearing assembly consisted of the inner and the outer races, the ball retainer, and the bearing balls.

II. EVALUATION PROCEDURES AND RESULTS:

A. Background History: It was reported that the assembly (identified as S/N 0007-1, manufactured by FAFNIR) had been used approximately three years ago in a Rulon A+5% MoS₂ (Teflon/MoS₂/inert filler composite) "run-in" test operation. Recently, the subject bearing was returned to the manufacturer for re-cleaning. Upon receiving the supposedly cleaned assembly, it was placed in the test station for "run-in" with a Meldin PI-30X (polyimide-Teflon) self-lubricating retainer. Almost immediately after the start of this "run-in" operation, erratic, abnormal torque behavior of the bearing developed.

B. Retainer Examination:

1. Appearance: One of the retainer ball pockets was sectioned for microscopic examination. No noticeable topographical irregularities (e.g., wear scars) were observed on the ball pocket surface at 100X magnification.
2. Specific Gravity: The specific gravity of the retainer material was determined to be 1.59, as tested with a pycnometer.

3. IR Analysis: A small piece of this retainer material was ground with potassium bromide powder and analyzed with an infrared spectrophotometer (KBr pellet technique). The IR spectrum showed the absorption bands which are characteristics of polyimide and Teflon.

All of the above tests indicated that the retainer material in the bearing assembly is probably Meldin PI-30X, a Teflon impregnated polyimide self-lubricating composite.

C. Bearing Balls:

1. Appearance: The surface of the bearing balls was microscopically examined, and photographed at 100X magnification using a Reichert Metallograph. Two heavy strips of transfer film (approximately 3.3 mm long and 0.45 mm wide) were found directly opposite to each other (180° apart) on most of the balls (see Figure 1).
2. IR Analysis: An attempt was made to partially remove the transfer films from the ball surfaces by placing the balls (22 each) and potassium bromide powder in a vial of vibrator-mixer, and agitating the vial vigorously. The extracted KBr sample was molded into a pellet, and analyzed with an IR spectrophotometer. IR analysis indicated that the transfer film contained polyamides (i.e., nylon). No absorption bands which are characteristics of Teflon were found on the IR spectrum.
3. SEM and EDX Analysis: The surface of one ball was examined by high magnification scanning electron (SEM) photomicrography. The same areas were further evaluated with x-ray energy dispersion spectroscopy (EDX) in the SEM analyzer. The EDX revealed that the ball surface contained molybdenum and sulfur.

All of the above results indicate that the ball surfaces contain film strips of an MoS₂-impregnated, polyamide-type lubricant. Teflon impregnated polyimide (from the retainer) was not detected on the ball surfaces. It will be shown that the lubricant film readily transferred to the clean ball surfaces from the races already containing a polyamide-MoS₂ film, before any transfer of film from the Meldin PI-30X self-lubricating retainer began.

D. Inner Race:

1. Appearance: The ball path of the inner race was also microscopically examined and photographed at 100 X magnification using a Reichert Metallograph with white light (xenon) illumination. A complete, 1 m long montage of the photographs,

equivalent to a 1 cm long segment of the ball path, was prepared to show the appearance of the transfer film and their interference fringes. Portions of the montage are shown in Figures 2 and 3. As shown in these figures, photomicrographic examination of the ball path revealed alternating bare and film containing segments. Each heavy transfer film section (approximately 2.6 mm long and 0.45 mm wide) is followed by a bared transfer film section (about 3.4 mm long and 0.6 mm wide). The light transfer film sections are believed to be contacted by the ball surfaces, causing transfer of the poorly adhering race film to the balls (Figure 1). At one end of each bared race path segment, there is a transfer film build-up, exhibiting colorful interference fringes. Using the optical film thickness determination method described in Ref. 1, the thickness of the transfer film "bumps" was estimated to be about 12,000Å (see Figures 2 and 3). It appears that a position of the removed transfer film within each bared segment was displaced (roll-squeezed) to one end of the segment by the rolling ball. Note that the formation of similar bumps was reported in Ref. 2. The length of the segments indicate a total included angle of 5 degrees of bearing oscillation.

2. Cotton Swab Test: The transfer film on the ball path was rather easily removed when rubbed with a dry cotton swab. This indicated that the transfer film was loosely adhered to the ball path surface.
3. Carbon Tetrachloride Extraction: An attempt was made, but without success, to remove the race transfer film with carbon tetrachloride. This indicated that the transfer film could neither be delaminated nor dissolved in carbon tetrachloride (surface tension ≈ 27 dynes/cm).
4. IR Analysis: The race was immersed in spectroquality grade DMF (N,N-Dimethylformamide), and an IR analysis was conducted on this DMF extract. It was revealed that the transfer film is constituted of polyamides and inorganic nitrates. The presence of polyimide absorption bands was not detected.
5. SEM and EDX Analysis: Due to the large size and configuration of the race, SEM and EDX analyses could not be conducted on the ball path surface.

The above evaluations substantiated that the transfer film on the ball path and on the balls are polyamides, and not polyimides.

G. C. Barnett

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2717.32/245

- E. Outer Race: The outer race ball path appeared similar to that of the inner race when cursorily examined with a magnifying lens. No further evaluation was, therefore, conducted on the outer race ball path transfer film.

III. CONCLUSIONS:

A variety of standard and special tests indicated that the GOES gimbal bearing race ball paths may have been originally lubricated with an MoS_2 /polyamide (nylon) self-lubricating composite film instead of the Teflon-containing Rulon A+5% MoS_2 layer, as it was previously believed. It cannot be said with certainty whether the original polyamide/ MoS_2 film was formed by a "run-in" process or by some type of a stick-burnishing technique. It is, however, certain that the so-called cleaning procedure did not remove that film. It only caused a reduction in adhesion, which was shown thermodynamically feasible in Ref. 3 and its actual occurrence was demonstrated in both References 3 and 4.

It is also apparent that during the recent brief "run-in" period with the Meldin PI-30X retainer, no polyimide transfer film of any observable kind formed on either the balls or the races.

IV. RECOMMENDATIONS FOR FUTURE WORK:

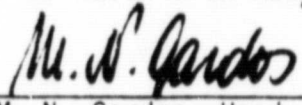
Currently, the only failure prediction technique dealing with the wear life of self-lubricated bearings is the one developed by Hughes technologists (References 1 and 2).

Actual gimbal bearing tests with a given composite are of limited value: the results are useful only to show short-term, first order bearing behavior, unless the tests are life tests. With the ever-increasing life requirements for space vehicles, life testing is rapidly becoming prohibitive in terms of both lead time and cost. Moreover, if the retainer material is not selected by wear testing, starting full-fledged bearing tests with no or limited knowledge of fundamental composite behavior in bearings is, to say the least, risky.

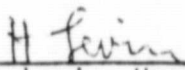
Establishing confidence in long-term, self-lubricated bearing performance requires the use of the Materials Technology Department's bearing simulator apparatus and the composite wear equations developed therefrom (References 1 and 2). While Meldin PI-30X is a reasonable choice to replace Rulon A+5% MoS_2 as the GOES gimbal bearing retainer material, the wear and transfer film formation mechanism of the Meldin is probably significantly different from that of Rulon A+5% MoS_2 .


H. S. Noji

Approved:


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Surface Physics Group
Materials Physics Section

and


H. Levin, Head
Materials Physics Section
Materials Technology Dept.

REFERENCES

- (1) Gardos, M. N. to Kramer, N. R., "Predictability of AIRS Gimbal Bearing Performance - Progress Report I," HAC TIC No. 2717.32/157, 27 June 1974.
- (2) Gardos, M. N. to Kramer, N. R., "Predictability of AIRS Gimbal Bearing Performance - Summary Report," HAC TIC No. 2717.32/179, 31 July 1974.
- (3) Gardos, M. N. to Kramer, N. R., "Effect of Air and Humidity on the Corrosion of the AIRS Gimbal Bearings at Room Temperature - Summary Report," HAC TIC No. 2717.32/244, 11 July 1974.
- (4) Noji, H. S. to Kramer, N. R., "Effect of Short-term Air and Saturated Humidity Exposure on the AIRS Gimbal Bearings at Room Temperature," HAC TIC No. 2717.32/243, 5 November 1974.

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BLACK AND WHITE PHOTOGRAPH

FIGURE 1. BEARING BALL SURFACE: TRANSFER FILM (100X); (A) Partially transferred film;
(B) Heavily transferred film

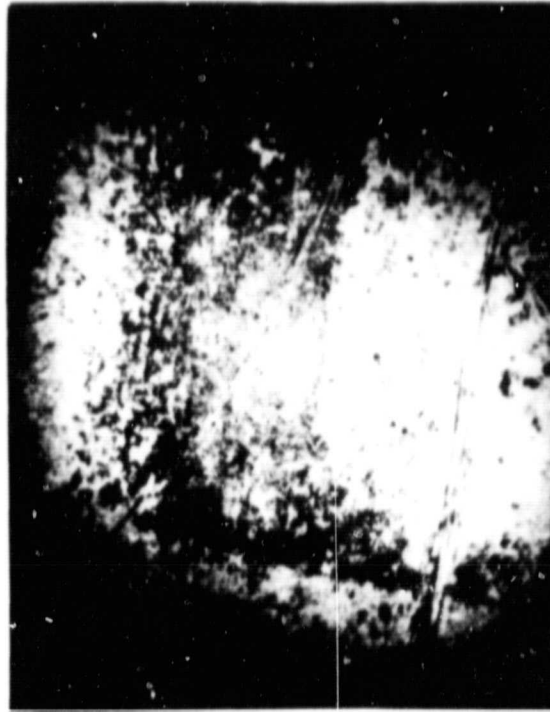


FIGURE 2. RACE BALL PATH:HEAVY TRANSFER FILM SECTION (100X); (see continuation of montage in Figure 3).



FIGURE 3. RACE BALL PATH-BARED TRANSFER FILM SECTION (100X)



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Appendix B

VISSR/GOES SYSTEM, ACL 49465

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MODEL IDENTIFIY	REVISIONS			
	SYM	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE	20 DEC 1974	
RECORD	B	COMPLETELY REVISED PER ECR 304/01	20 MAR 1975	
RECORD	C	COMPLETELY REVISED PER ECR 421/01	26 JUN 75	
RECORD	D	COMPLETELY REVISED PER ECR 459/01	12 SEP 75	
RECORD CHANGE	E	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 489/03	19Dec75	
RECORD CHANGE	F	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 524/01.	29Mar76	
RECORD CHANGE	G	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 535/01.	11June76	
RECORD CHANGE	H	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 551/01.	13Sep76	

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<i>[Signature]</i> 12-19-74		SIZE A	CODE IDENT NO. 11323	NUMBER ACL 49465
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15744	13												
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10E	44345-2	1										SCANNER ASSY-VISSR/GOES	*
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2J	45094-2	1										ELECTRONICS MODULE ASSY(UNIT 2)	Y
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3E	46888	X										VISSR SCANNER(ICD)	B
6A	19190	X										SPEC-SHIPPING CONTAINER, VISSR	A
2D	49414-1	X										OPTICAL ADJUSTMENTS & MEASUREMENTS	F
/	49414-99		1									CABLE ASSY,W1-W7,PER 25659	F
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B
/	49414-96		1									CABLE ASSY,W8-W13 & W61,PER 25659	F
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B
1F	45742		1									COVER ASSY,TEST-RADN COOLER	E
1F	45720			1								COVER, CONE	C
1D	45721			1								RING, MOUNTING, CRYOSTAT	A
/	45721-99				1							RING	A
1F	45722			1								RING, MOUNTING, COVER	A
1F	45723			1								RING, MOUNTING, RETAINER	A
/	45723-99				1							RING	A
1B	26195			1								WINDOW, CRYOSTAT	B
1B	27084			1								COVER,WINDOW-CRYO ASSY	A
1C	28140			2								HOUSING-WITNESS MIRROR HOLDER	B
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	28139			2								BASEPLATE-WITNESS MIRROR HOLDER	B
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1B	28138			4								SPRING-WITNESS MIRROR HOLDER	A
1B	28137			4								NUTPLATE-WITNESS MIRROR HOLDER	A
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
/	45749-99			2								GASKET,RUBBER,FCARBON SPRING	E
4A	18962			X								PROC SPEC,BONDING W/EPOXY ADHESIVE	B
1D	26200			X								CRYOSTAT ASSY-VISSR/GOES	D
1F	44656			X								SHIELD,RADIATION COOLER	H
6A	19467			X								INSTL&REML CLR TEST CVR&CRYOSTAT	C
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1D	27191		1									WEAR CABLE ASSY(W107)	B
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
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14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
1F	27189		1									WEAR CABLE ASSY(W105)	C

*For Rev Ltr see Note on Sheet 14.

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1D 27186		1									WEAR CABLE ASSY(W101)	C
14A 19049			X								SPOT BONDING ELECT COMPONENTS	D
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1C 26471		1									PLATE, MTG-ELECT MOD	A
1D 26200		1									CRYOSTAT ASSY-VISSR/GOES	D
1D 24149			1								FILTER, FLARED TUBE	C
/ 24149-99				1							RETAINER, CRFS TYPE 303SE, QQ-S-763	C
/ 24149-98				1							FITTING, CRFS TYPE 303SE, QQ-S-763	C
/ 24149-97				1							NUT, CRFS TYPE 303SE, QQ-S-763	C
/ 24149-96				1							HOUSING, CRFS TYPE 303SE, QQ-S-763	C
1C 26190			1								CRYOSTAT SUP-ASSY	B
1B 26184				1							COLD END, CRYOSTAT	A
1B 26185				1							MANDREL, CRYOSTAT	A
1C 26186				1							WARM END, CRYOSTAT	A
1B 26187				1							HEAT SINK	A
1B 26188				1							SHROUD, CRYOSTAT	A
1B 26189				1							RING, SHROUD	A
1B 26191			1								STEM, CRYOSTAT	A
1C 26192			1								HOUSING, CRYOSTAT	A
1B 26193			1								FITTING, EXHAUST (MAKE FR AN815-4C)	A
1B 26194			1								FITTING, INLET	A
1B 26196			1								GUIDE, CRYOSTAT-VISSR/GOES	B
1C 26197			1								MOUNT CRYOSTAT	B
1B 26199			1								BELLOWS, CRYOSTAT-VISSR/SMS	B
1B 25750		3									INSULATOR, SHOULDERED	A
1D 25748		1									BRACKET, CNCTR	A
1F 25440-2		1									RING, HANDLING (MAG)	H
10A 19119		X									GEN HANDLG SHPG&CONTAM CONT RGTS	B
19A 19145		X									INITIAL CHANNEL ALIGNMT-VISSR/GOES	D
13A 19146		X									DET PROC-PRT LAB MOD XFER FUNC MSR	C
22A 19147		X									DET PROC-RELATIVE SPECT RESPONSE	E
31A 19148		X									DET PROC-REF MIR ALIGN MSR	E

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6A	19190			X								SPEC-SHIPPING CONTAINER, VISSR	A
5A	19250			X								CLNG PROC-VAC DEPD ALUM-RAON CLR	A
6A	19251			X								CLNG PROC, ALL PLTD PTS, VISSR COOLER	A
6A	19457			X								INSTL & REMVL CLR TEST CVR & CRYOSTAT	C
11A	194P6			X								TURN ON/OFF PROC VISSR LAB TEST	B
41A	19629			X								TECHNICAL SPEC-VISSR/GOES R&C	F
80A	19644			Y								TEST SPEC-CALIBR&ACC TEST, GOES R&C	F
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1F	26P65			X								SLING ASSY, LIFTING	A
10E	44345			X								SCANNER ASSY-VISSR/SMS-GOES	*
2J	45094			X								ELECTRONICS MODULE ASSY (UNIT 2)	Y
1F	45943			X								VISSR FUNCTIONAL FLK DIAG	B
1C	45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D	45948			X								POWER & GROUNDING BLK DIAG	A
1F	49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
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/	49414-96			1								CABLE ASSY, W8-W13 & W61, PER 25659	F
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B
1F	45749			1								COVER ASSY, TEST-RAON COOLER	E
1F	45720				1							COVER, CONE	C
1D	45721				1							RING, MOUNTING, CRYOSTAT	A
/	45721-99					1						RING	A
1F	45722				1							RING, MOUNTING, COVER	A
1F	45723				1							RING, MOUNTING, RETAINER	A
/	45723-99					1						RING	A
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3A	18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1C	28139				2							BASEPLATE-WITNESS MIRROR HOLDER	B
3A	18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1B	28138				4							SPRING-WITNESS MIRROR HOLDER	A
1E	28137				4							NUTPLATE-WITNESS MIRROR HOLDER	A
3A	18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
/	45749-99				2							GASKET, RUBBER, FCAPBON SPRING	E

*For Rev Ltr see Note on Sheet 14.

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6A	19467				X							INSTL&REML CLR TEST CVR&CRYOSTAT	C
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1D	27187			1								WEAR CABLE ASSY(W103)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27186			1								WEAR CABLE ASSY(W101)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1B	27067			3								SPACER, INSULATOR	A
1C	26472-2			1								BRACKET, SPT-ELECT MOD	A
1C	26472-1			1								BRACKET, SPT-ELECT MOD	A
1C	26471			1								PLATE, MTG-ELECT MOD	A
1D	26200			1								CRYOSTAT ASSY-VISSR/GOES	D
1D	24149				1							FILTER, FLARED TUBE	C
/	24149-99					1						RETAINER, CRFS TYPE 303SE, QQ-S-763	C
/	24149-98					1						FITTING, CRFS TYPE 303SE, QQ-S-763	C
/	24149-97					1						NUT, CRFS TYPE 303SE, QQ-S-763	C
/	24149-96					1						HOUSING, CRFS TYPE 303SE, QQ-S-763	C
1C	26190				1							CRYOSTAT SUB-ASSY	B
1B	26184					1						COLD END, CRYOSTAT	A
1B	26185					1						MANDREL, CRYOSTAT	A
1C	26186					1						WARM END, CRYOSTAT	A
1B	26187					1						HEAT SINK	A
1B	26188					1						SHROUD, CRYOSTAT	A
1B	26189					1						RING, SHROUD	A
1B	26191					1						STEM, CRYOSTAT	A
1C	26192					1						HOUSING, CRYOSTAT	A
1B	26193					1						FITTING, EXHAUST(MAKE FR AN815-4C)	A
1B	26194					1						FITTING, INLET	A

TITLE

REV H

NUMBER

ACL 49465

VISSR/GOES SYSTEM

SHEET

5

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.		NO. REQUIRED FOR ONE NEXT ASSY										NOVENCILATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1B	26196				1							GUIDE,CRYOSTAT-VISSR/GOES	B
1C	26197				1							MOUNT CRYOSTAT	B
1B	26199				1							BELLOWS,CRYOSTAT-VISSR/SMS	B
1B	25750			3								INSULATOR,SHOULDEPED	A
1D	25748			1								BRACKET,CNCTR	A
1F	25440-2			1								RING,HANDLING(MAG)	H
10A	19119			X								GEN HNDLG SHPG&CONTAM CONT RQTS	B
7A	19182			X								OPTICAL ALIGN-VISSR TO CALIBRATOR	B
59A	15735			X								VISSR/GOES BENCH TEST PROC	C
16A	15418			X								CLN&HNDL PROC-OPT COMP&SUBASSY	B
6A	19190			X								SPEC-SHIPPING CONTAINER, VISSR	A
5A	19250			X								CLNG PROC-VAC DEPD ALUM-RADN CLR	A
6A	19251			X								CLNG PROC,ALL PLTD PTS,VISSR COOLER	A
6A	19467			X								INSTL&REMOV CLR TEST CVR&CRYOSTAT	C
11A	19486			X								TURN ON/OFF PROC VISSR LAB TEST	B
41A	19629			X								TECHNICAL SPEC-VISSR/GOES B&C	F
80A	19644			X								TEST SPEC-CALIB&ACC TEST,GOES B&C	F
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B
1F	26865			X								SLING ASSY,LIFTING	A
10E	44345			X								SCANNER ASSY-VISSR/SMS-GOES	*
2J	45094			X								ELECTRONICS MODULE ASSY(UNIT 2)	Y
1F	45943			X								VISSR FUNCTIONAL PLK DIAG	B
1C	45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D	45948			X								POWER & GROUNDING BLK DIAG	A
1F	49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2F	26297			X								HDLG SLING-SCANNER	C
2D	49414-3	X										MASS PROPERTIES,VISSR/GOES	F
1B	27067			3								SPACER,INSULATOR	A
1B	25750			3								INSULATOR,SHOULDEPED	A
1F	25440-2			1								RING,HANDLING(MAG)	H
10A	19119			X								GEN HNDLG SHPG&CONTAM CONT RQTS	B
11A	19325			X								VISSR MASS PROPERTIES TEST	B
16A	15418			X								CLN&HNDL PROC-OPT COMP&SUBASSY	B
6A	19190			X								SPEC-SHIPPING CONTAINER, VISSR	A
5A	19250			X								CLNG PROC-VAC DEPD ALUM-RADN CLR	A
6A	19251			X								CLNG PROC,ALL PLTD PTS,VISSR COOLER	A
11A	19486			X								TURN ON/OFF PROC VISSR LAB TEST	B
41A	19629			X								TECHNICAL SPEC-VISSR/GOES B&C	F
80A	19644			X								TEST SPEC-CALIB&ACC TEST,GOES B&C	F
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B

*For Rev Ltr see Note on Sheet 14.

TITLE	REV H	NUMBER	ACL 49465
VISSR/GOES SYSTEM			
		SHEET	6

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1F	26065			X								SLING ASSY, LIFTING	A
10E	44345			X								SCANNER ASSY-VISSR/SMS-GOES	*
2J	45094			X								ELECTRONICS MODULE ASSY(UNIT 2)	Y
1F	45943			X								VISSR FUNCTIONAL FLK DIAG	B
1C	45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D	45948			X								POWER & GROUNDING BLK DIAG	A
1F	49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2F	26297			X								HDLG SLING-SCANNER	C
2D	49414-4		X									SCANNER VIBRATION, VISSR/GOES	F
/	49414-98			1								CABLE ASSY, W5 & W7, PER 25659	F
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B
/	49414-95			1								CABLE ASSY, W9, PER 25659	F
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B
/	49414-94			1								CABLE ASSY, W8, W13 & W61, PER 25659	F
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B
1D	27192			1								WEAR CABLE ASSY(W102)	C
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1D	27191			1								WEAR CABLE ASSY(W107)	B
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1D	27190			1								WEAR CABLE ASSY(W106)	B
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1F	27189			1								WEAR CABLE ASSY(W105)	C
/	27189-99				2							JUNCTION SHELL(MAKE FROM DD24661)	C
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1D	27188			1								WEAR CABLE ASSY(W104)	D
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1D	27187			1								WEAR CABLE ASSY(W103)	B
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1D	27186			1								WEAR CABLE ASSY(W101)	C
14A	19049				X							SPOT PONDING ELECT COMPONENTS	D
1B	27067			3								SPACER, INSULATOR	A
1B	25750			3								INSULATOR, SHOULD FRED	A
1D	25748			1								BRACKET, CNCTR	A
1F	25440-2			1								RING, HANDLING(MAG)	H
10A	19119				X							GEN HDLG SHPG&CONTAM CONT RGTS	B
33A	19278				X							VIBRATION TEST PROC	D
16A	15418				X							CLN&HDL PROC-OPT COMP&SUBASSY	B
6A	19190				X							SPEC-SHIPPING CONTAINER, VISSR	A
5A	19250				X							CLNG PROC-VAC DEPT ALUM-RADN CLR	A
6A	19251				X							CLNG PROC, ALL PLTD PTS, VISSR COOLER	A

*For Rev Ltr see Note on Sheet 14.

TITLE	REV H	NUMBER	ACL 49465
VISSR/GOES SYSTEM			
		SHEET	7

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.		NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE		REV
		0	1	2	3	4	5	6	7	8	9			
11A	19406			X								TURN ON/OFF PROC VISSR LAR TEST	B	
41A	19629			X								TECHNICAL SPEC-VISSR/GOES PAC	F	
80A	19644			X								TEST SPEC-CALIB&ACC TEST,GOES PAC	F	
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B	
1F	26865			X								SLING ASSY,LIFTING	A	
10F	44345			X								SCANNER ASSY-VISSP/SMS-GOES	*	
2J	45094			X								ELECTRONICS MODULE ASSY(UNIT 2)	Y	
1F	45943			X								VISSP FUNCTIONAL FLK DIAG	B	
1C	45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B	
1D	45948			X								POWER & GROUNDING BLK DIAG	A	
1F	49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A	
2F	26297			X								HDLG SLING-SCANNER	C	
2D	49414-5		X									OPTICAL CHECK,VISSR/GOES	F	
/	49414-99			1								CABLE ASSY,W1-W7,PER 25659	F	
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B	
/	49414-96			1								CABLE ASSY,W8-W13 & W61,PER 25659	F	
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B	
1F	45749			1								COVER ASSY,TEST-RADN COOLER	E	
1F	45720				1							COVER, CONF	C	
1D	45721				1							RING, MOUNTING, CRYOSTAT	A	
/	45721-99					1						RING	A	
1F	45722				1							RING, MOUNTING, COVER	A	
1F	45723				1							RING, MOUNTING, RETAINER	A	
/	45723-99					1						RING	A	
1B	26195				1							WINDOW, CRYOSTAT	B	
1B	27084				1							COVER,WINDOW-CRYO ASSY	A	
1C	2A140				2							HOUSING-WITNESS MIRROR HOLDER	B	
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D	
1C	2A139				2							BASEPLATE-WITNESS MIRROR HOLDER	B	
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D	
1B	2A138					4						SPRING-WITNESS MIRROR HOLDER	A	
1B	2A137					4						NUTPLATE-WITNESS MIRROR HOLDER	A	
3A	1A863						X					PRCS-APPL OF FLAT BLACK PAINT	D	
/	45749-99				2							GASKET,RUBBER,FCARBON SPRING	E	
4A	1A962				X							PROC SPEC,BONDING W/EPOXY ADHESIVE	B	
1D	26200				X							CRYOSTAT ASSY-VISSR/GOES	D	
1F	44656				X							SHIELD,RADIATION COOLER	H	
6A	19467				X							INSTL&REVL CLR TEST CVR&CRYOSTAT	C	
1D	27192		1									WEAR CABLE ASSY(W102)	C	
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D	

*For Rev Ltr see Note on Sheet 14.

TITLE	REV H	NUMBER	ACL 49465
VISSR/GOES SYSTEM			SHEET 8

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	27191		1									WEAR CABLE ASSY(W107)	B
14A	19049			X								SPOT BONDING FLECT COMPONENTS	D
1D	27190		1									WEAR CABLE ASSY(W106)	B
14A	19049			X								SPOT BONDING FLECT COMPONENTS	D
1F	27189		1									WEAR CABLE ASSY(W105)	C
/	27189-99			2								JUNCTION SHELL(MAKE FROM DD24661)	C
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
1D	27188		1									WEAR CABLE ASSY(W104)	D
14A	19049			X								SPOT BONDING FLECT COMPONENTS	D
1D	27187		1									WEAR CABLE ASSY(W103)	B
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
1D	27186		1									WEAR CABLE ASSY(W101)	C
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
1F	27067		3									SPACER, INSULATOR	A
1C	26472-2		1									BRACKET, SPT-ELECT MOD	A
1C	26472-1		1									BRACKET, SPT-ELECT MOD	A
1C	26471		1									PLATE, MTG-ELECT MOD	A
1D	26200		1									CRYOSTAT ASSY-VISSR/GOES	D
1D	24149			1								FILTER, FLARED TUBE	C
/	24149-99				1							RETAINER, CRFS TYPE 303SE, QQ-S-763	C
/	24149-98				1							FITTING, CRFS TYPE 303SE, QQ-S-763	C
/	24149-97				1							NUT, CRFS TYPE 303SE, QQ-S-763	C
/	24149-96				1							HOUSING, CRFS TYPE 303SE, QQ-S-763	C
1C	26190			1								CRYOSTAT SUP-ASSY	B
1B	26184				1							COLD END, CRYOSTAT	A
1B	26185				1							MANDREL, CRYOSTAT	A
1C	26186				1							WARM END, CRYOSTAT	A
1B	26187				1							HEAT SINK	A
1B	26188				1							SHROUD, CRYOSTAT	A
1B	26189				1							RING, SHROUD	A
1B	26191			1								STEM, CRYOSTAT	A
1C	26192			1								HOUSING, CRYOSTAT	A
1B	26193			1								FITTING, EXHAUST(MAKE FR AN815-4C)	A
1B	26194			1								FITTING, INLET	A
1B	26196			1								GUIDE, CRYOSTAT-VISSR/GOES	B
1C	26197			1								MOUNT CRYOSTAT	B
1B	26199			1								BELLOWS, CRYOSTAT-VISSR/SMS	B
1B	25750		3									INSULATOR, SHOULDERED	A
1C	25748		1									BRACKET, CNCTR	A
1F	25440-2		1									RING, HANDLING(MAG)	H

TITLE
VISSR/GOES SYSTEM

REV H

NUMBER ACL 49465

SHEET 9

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
	0	1	2	3	4	5	6	7	8	9		
10A	19119		X								GEN INDLG SHPG&CONTAM CONT ROTS	B
16A	15418		X								CLM&HDL PROC-OPT COMPASUBASSY	B
6A	19170		X								SPFC-SHIPPIG CONTAINER, VISSR	A
5A	19250		X								CLNG PROC-VAC DEPT ALUM-RADN CLR	A
6A	19251		X								CLNG PROC,ALL PLTD PTS,VISSR COOLER	A
6A	19467		X								INSTL&REMOVL CLR TEST CVR&HYOSTAT	C
17A	19469		X								CHECK FIELDS OF VIEW-VISSR/GOES	C
19A	19471		X								DET PROC REF MIRROR ALGNMT CHECK	C
11A	19476		X								TURN ON/OFF PROC VISSR LAB TEST	H
18A	19513		X								CHANNEL ALIGNMENT CHECK-VISSR/GOES	C
41A	19629		X								TECHNICAL SPEC-VISSR/GOES PAC	F
80A	19644		X								TEST SPEC-CALIB&ACC TEST,GOES B&C	F
99A	25659		X								INTERCONN LIST-INTERFACE CABLING	B
1F	26865		X								SLING ASSY,LIFTING	A
10E	44345		X								SCANNER ASSY-VISSR/SMS-GOES	*
2J	45094		X								ELECTRONICS MODULF ASSY(UNIT 2)	Y
1F	45943		X								VISSR FUNCTIONAL FLK DIAG	B
1C	45947		X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D	45948		X								POWER & GROUNDING BLK DIAG	A
1F	49471		X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2F	26297		X								HDLG SLING-SCANNER	C
2D	49414-6	X									PARAMETER ADJ & PRELIM CALIB	F
/	49414-97		1								CABLE ASSY,W14-W19-W23,PER 25659	F
99A	25659			X							INTERCONN LIST-INTERFACE CABLING	B
/	49414-96		1								CABLE ASSY,W8-W13 & W61,PER 25659	F
99A	25659			X							INTERCONN LIST-INTERFACE CABLING	B
1D	27192		1								WEAR CABLE ASSY(W102)	C
14A	19049			X							SPOT PONDING ELECT COMPONENTS	D
1D	27191		1								WEAR CABLE ASSY(W107)	B
14A	19049			X							SPOT PONDING ELECT COMPONENTS	D
1D	27190		1								WEAR CABLE ASSY(W106)	B
14A	19049			X							SPOT PONDING ELECT COMPONENTS	D
1F	27189		1								WEAR CABLE ASSY(W105)	C
/	27189-99			2							JUNCTION SHELL(MAKE FROM DD24661)	C
14A	19049			X							SPOT PONDING ELECT COMPONENTS	D
1D	27188		1								WEAR CABLE ASSY(W104)	D
14A	19049			X							SPOT PONDING ELECT COMPONENTS	D
1D	27187		1								WEAR CABLE ASSY(W103)	B
14A	19049			X							SPOT PONDING ELECT COMPONENTS	D
1D	27186		1								WEAR CABLE ASSY(W101)	C

*For Rev Ltr see Note on Sheet 14.

TITLE	REV	NUMBER	ACL
VISSR/GOES SYSTEM	H		49465
			SHEET 10

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										ENCLOSURE	REV
	0	1	2	3	4	5	6	7	8	9		
14A 15049				X							SPOT BONDING FLECT COMPONENTS	D
1F 27067			3								SPACER, INSULATOR	A
1B 25750			3								INSULATOR, SHOULDERED	A
1C 25748			1								BRACKET, CNCTR	A
1F 25440-1			1								RING, HANDLING (GRES)	H
10A 19119			X								GEN HNDLG SHPG&CONTAM CONT ROTS	B
7A 191A2			X								OPTICAL ALIGN-VISSR TO CALIBRATOR	B
59A 15737			X								TURN-ON & FUNCTIONAL TEST PROC	C
94A 15736			X								PARAMETER ADJUSTMENT PROC	A
70A 15739			X								VISSR/GOES TYPE I TEST PROC	B
84A 15740			X								VISSR/GOES TYPE II TLST PROC	B
99A 15742			X								VISSR/GOES CALIBRATION TEST PROC	H
39A 19432			X								PROC-BAKEOUT VAC CHMBR&TEST SETUP	C
16A 15418			X								CLN&HDL PROC-OPT COMP&SUBASSY	B
6A 19190			X								SPEC-SHIPPING CONTAINER, VISSR	A
5A 19250			X								CLNG PROC-VAC DEPT ALUM-RADN CLR	A
6A 19251			X								CLNG PROC, ALL PLTD PTS, VISSR COOLER	A
11A 194A6			X								TURN ON/OFF PROC VISSR LAB TEST	B
41A 19629			X								TECHNICAL SPEC-VISSR/GOES B&C	F
80A 19644			X								TEST SPEC-CALIB&ACC TEST, GOES B&C	F
99A 25659			X								INTERCONN LIST-INTERFACE CABLING	B
1F 268F5			X								SLING ASSY, LIFTING	A
10E 44345			X								SCANNER ASSY-VISSP/SMS-GOES	*
2J 45094			X								ELECTRONICS MODULE ASSY(UNIT 2)	Y
1F 45943			X								VISSP FUNCTIONAL PLK DIAG	B
1C 45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D 45948			X								POWER & GROUNDING BLK DIAG	A
1F 49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2F 26297			X								HDLG SLING-SCANNER	C
2D 49414-7		X									ELECTRONICS MODULE VIBRATION	F
/ 49414-94			1								CABLE ASSY, W8, W13 & W61, PER 25659	F
99A 25659				X							INTERCONN LIST-INTERFACE CABLING	B
10A 19119			X								GEN HNDLG SHPG&CONTAM CONT ROTS	B
33A 19278			X								VIBRATION TEST PROC	D
16A 15418			X								CLN&HDL PROC-OPT COMP&SUBASSY	B
6A 19190			X								SPEC-SHIPPING CONTAINER, VISSR	A
5A 19250			X								CLNG PROC-VAC DEPT ALUM-RADN CLR	A
6A 19251			X								CLNG PROC, ALL PLTD PTS, VISSR COOLER	A
11A 194A6			X								TURN ON/OFF PROC VISSR LAB TEST	B
41A 19629			X								TECHNICAL SPEC-VISSR/GOES B&C	F

*For Rev Ltr see Note on Sheet 14.

TITLE
VISSR/GOES SYSTEM

REV H

NUMBER ACL 49465

SHEET 11

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONF NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
80A	19644			X								TEST SPEC-CALIB&ACC TEST,GOES R&C	F
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B
1F	26865			X								SLING ASSY,LIFTING	A
2J	45094			X								ELECTRONICS MODULE ASSY(UNIT 2)	Y
1F	45943			X								VISSR FUNCTIONAL PLK DIAG	B
1C	45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D	45948			X								POWER & GROUNDING BLK DIAG	A
1F	49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2F	26297			X								HOLG SLING-SCANNER	C
2D	49414-8		X									RADIATION COOLER LOWEST TEMP.	F
/	49414-97			1								CABLE ASSY,W14-18&W19-23,PER 25659	F
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B
/	49414-96			1								CABLE ASSY,W8-W13 & W61,PER 25659	F
99A	25659				X							INTERCONN LIST-INTERFACE CABLING	B
1D	27192			1								WEAR CABLE ASSY(W102)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27191			1								WEAR CABLE ASSY(W107)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27190			1								WEAR CABLE ASSY(W106)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1F	27189			1								WEAR CABLE ASSY(W105)	C
/	27189-99				2							JUNCTION SHELL(MAKE FROM DD24661)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27188			1								WEAR CABLE ASSY(W104)	D
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27187			1								WEAR CABLE ASSY(W103)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27186			1								WEAR CABLE ASSY(W101)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1B	27067			3								SPACER,INSULATOR	A
1C	26472-2			1								BRACKET,SPT-ELECT MOD	A
1C	26472-1			1								BRACKET,SPT-ELECT MOD	A
1C	26471			1								PLATE,MTG-ELECT MOD	A
1R	25750			3								INSULATOR,SHOULDERED	A
1D	25748			1								BRACKET,CNCTR	A
1F	25440-1			1								RING,HANDLING(CRES)	H
10A	19119				X							GEN HNDLG SHPG&CONTAM CONT RGTS	B
16A	15418				X							CLN&HNDL PROC-OPT COMP&SUBASSY	B
6A	19190				X							SPEC-SHIPING CONTAINER, VISSR	A
5A	19250				X							CLNG PROC-VAC DEPD ALUM-RADN CLR	A

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	0	1	2	3	4	5	6	7	8	9		
6A 19251			X								CLNG PROC, ALL PLTD PTS, VISSR COOLER	A
11A 19406			X								TURN ON/OFF PROC VISSR LAB TEST	B
32A 15744			X								RADIATION COOLER SYSTEM TEST PROC	A
41A 19629			X								TECHNICAL SPEC-VISSR/GOES B&C	F
80A 19644			X								TEST SPEC-CALIB&ACC TEST, GOES B&C	F
99A 25659			X								INTERCONN LIST-INTERFACE CABLING	B
2F 26297			X								HOLG SLING-SCANNER	C
1F 26265			X								SLING ASSY, LIFTING	A
10E 44345			X								SCANNER ASSY-VISSR/SMS-GOES	*
2J 45094			X								ELECTRONICS MODULE ASSY(UNIT 2)	Y
1F 45943			X								VISSR FUNCTIONAL FLK DIAG	B
1C 45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D 45948			X								POWER & GROUNDING BLK DIAG	A
1F 49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2D 49414-9		X									THERMAL/VACUUM & FINAL CALIBRATION	F
/ 49414-99			1								CABLE ASSY, W1-W7, PER 25659	F
99A 25659				X							INTERCONN LIST-INTERFACE CABLING	B
/ 49414-96			1								CABLE ASSY, W8-W13 & W61, PER 25659	F
99A 25659				X							INTERCONN LIST-INTERFACE CABLING	B
1D 27192			1								WEAR CABLE ASSY(W102)	C
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1D 27191			1								WEAR CABLE ASSY(W107)	B
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1D 27190			1								WEAR CABLE ASSY(W106)	B
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1F 27189			1								WEAR CABLE ASSY(W105)	C
/ 27189-99				2							JUNCTION SHELL(MAKE FROM DD24661)	C
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1D 27188			1								WEAR CABLE ASSY(W104)	D
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1D 27187			1								WEAR CABLE ASSY(W103)	B
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1D 27186			1								WEAR CABLE ASSY(W101)	C
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1B 27067			3								SPACER, INSULATOR	A
1C 26472-2			1								BRACKET, SPT-ELECT MOD	A
1C 26472-1			1								BRACKET, SPT-ELECT MOD	A
1C 26471			1								PLATE, MTG-ELECT MOD	A
1B 25750			3								INSULATOR, SHOULDERED	A
1D 25748			1								BRACKET, CNCTR	A

*For Rev Ltr see Note on Sheet 14.

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1F	25440-1			1								RING HANDLING (CRES)	H
10A	19119			X								GEN HANDLG SHPG&CONTAM CONT RGTS	H
59A	15737			X								TURN-ON & FUNCTIONAL TEST PROC	C
70A	15739			X								VISSR/GOES TYPE I TEST PROC	B
84A	15740			X								VISSR/GOES TYPE II TEST PROC	B
99A	15742			X								VISSR/GOES CALIBRATION TEST PROC	B
16A	15418			X								CLN&HANDL PROC-OPT COMP&SUBASSY	B
6A	19190			X								SPEC-SHIPING CONTAINER, VISSR	A
5A	19250			X								CLNG PROC-VAC DEPT ALUM-RADN CLR	A
6A	19251			X								CLNG PROC, ALL PLTD PTS, VISSR COOLER	A
11A	19486			X								TURN ON/OFF PROC VISSR LAB TEST	B
41A	19629			X								TECHNICAL SPEC-VISSR/GOES R&C	F
80A	19644			X								TEST SPEC-CALIB&ACC TEST, GOES R&C	F
99A	25659			X								INTERCONN LIST-INTERFACE CABLING	B
1F	26865			X								SLING ASSY, LIFTING	A
10E	44345			X								SCANNER ASSY-VISSR/SMS-GOES	*
2J	45094			X								ELECTRONICS MODULE ASSY (UNIT 2)	Y
1F	45943			X								VISSR FUNCTIONAL BLK DIAG	B
1C	45947			X								BLOCK DIAG VISSR SCAN DRIVE LOGIC	B
1D	45948			X								POWER & GROUNDING BLK DIAG	A
1F	49471			X								OPTICAL SCHEM-VISSR/GOES SCANNER	A
2F	26297			X								HOLG SLING-SCANNER	C

NOTE: An asterisk (*) appearing in the Revision Letter column on the preceding pages identifies a released but unincorporated change to the listed document. The data contained within each released E.O. is included in this ACL. Each affected document, its current revision letter and released outstanding E.O.(s) are listed below.

<u>DRAWING NO.</u>	<u>REV</u> <u>LTR</u>	<u>APPLICABLE E.O. NO(s)</u>
44345	R	4668

In addition, the following listed document has an unincorporated change in process as indicated by the applicable ECR number.

<u>DRAWING NO.</u>	<u>REV</u> <u>LTR</u>	<u>APPLICABLE ECR NO(s)</u>
45094	Y	475/01R1 (End-Of-Contract Effectivity)

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Appendix C

VISSR/GOES SCANNER ASSEMBLY, ACL 44345-2

MODEL EFFECTIVITY	REVISIONS			
	SYM	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE	20 DEC 1974	
RECORD	B	COMPLETELY REVISED PER ECR 304/02	20 MAR 1975	
RECORD	C	COMPLETELY REVISED PER ECR 421/02	26 JUN 75	
RECORD	D	COMPLETELY REVISED PER ECR 459/02	18 SEP 75	
RECORD CHANGE	E	Revised & Updated as req'd to reflect current status of all drawings. As req'd by ECR 489/03	19 Dec 75	
RECORD CHANGE	F	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 524/03	29 Mar 76	
RECORD CHANGE	G	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 535/03	11 June 76	
RECORD CHANGE	H	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 551/03	13 Sep 76	

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CONTRACT NO. NAS5-20660		SANTA BARBARA RESEARCH CENTER A Subsidiary of Hughes Aircraft Company GOLETA, CALIFORNIA	
PREPARED <i>[Signature]</i>	18 DEC 74	TITLE VISSR/GOES SCANNER ASSEMBLY	
CHECKED <i>[Signature]</i>	12/12/74		
APPROVED <i>[Signature]</i>	12/13/74		
APPROVED			
SIZE A		CODE IDENT NO. 11323	NUMBER ACL 44345-2
SCALE <i>[Signature]</i> 12-19-74		SHEET 1 OF 28	

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15425	20																
15466	20																
15467	20																
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15868	9																
15869	9																
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18761	3	4	5	10													
18762	2	3	4	5	10	11	22	23	24	25	26						
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/	44345-99		AR									AL ALY TURING,.20FID X.022WALL	*
/	44345-98		AR									HOOK FSTNR, 5/8 WIDE, PLK	*
/	44345-97		AR									DOUBLER	*
/	44345-96		AR									LACING TAPE,TYPE IV,FIN A.SIZE 4	*
/	44345-95		AR									DOUBLER, 1.0 WIDE	*
/	44345-94		2									SHT,FL.LAM,I-P-509,TYPE 4,GR.G-10	*
/	44345-93		1									RUBBER,VITON,TYPE 2,CL.1,.031THK	*
/	44345-92		3									GASKET,RUBBER,VITON SPONGE	*
3F	44333		1									MAIN FRAME ASSY-VISSR/GOES SCANNER	B
4F	44509			1								HOUSING & RING ASSY	J
1F	44500				1							HOUSING, TELESCOPE	A
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
2F	44510				1							RING,SUPPORT-MAIN FRAME-VISSR/GOES	D
/	44510-99					1						RING,.150 CRS BERYLLIUM	D
/	44510-98					1						RING,.150 CRS BERYLLIUM	D
/	44510-97					1						RING,.150 CRS BERYLLIUM	D
/	44510-96					1						RING,.150 CRS BERYLLIUM	D
/	44510-95					4						GUSSET,.150CRS	D
/	44510-94					3						BOSS,3.75HPR BERYLLIUM	D
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
1D	445498				4							BRACE SUPPORT LEGS SCANNER	B
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
1D	445499				2							BRACE,ELEC SPRT LEG	B
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
5A	19003					X						PRCS-STRUCT BONDING BERYLLIUM	A
3A	19048					X						PRCS-APPL OF WHITE EPOXY COATING	C
1F	44512			1								SUPPORT LF LEG ENCODER SCANNER	F
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
4A	1A762					X						CHROMIC ACID ANODIZING BERYL	A
1F	44821			1								SUPPORT RT LEG ENCODER	E
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
4A	1A762					X						CHROMIC ACID ANODIZING BERYL	A
1F	44837			1								ELECTRONICS SUP LFG MF ASSY SCAN	G

*For Rev Ltr see Note on Sheet 28.

TITLE VISSR SCANNER ASSY
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
1D	49342-1		1									STIFFENER,LFG,MAIN FRAME ASSY	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	49342-2		1									STIFFENER,LFG,MAIN FRAME ASSY	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44822		1									DIAPHRAGM ENCODER SCANNER	B
1D	49343		1									STIFFENER,RIGHT STRUT,MAIN FRAME	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	49341		1									STIFFENER,LEFT STRUT,MAIN FRAME	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44515		1									STRUT SUP SFC MIRROR SCANNER	C
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44829		1									ADJ MOUNT, SEC MIRROR, MF ASSY	B
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
1D	44934		1									APERTURE STOP,MAIN FRAME ASSY	B
1D	45529		1									ADAPTER,ALIGNMENT MIRROR,SYSTEM	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	44511		2									ADAPTER,ALIGN MIRROR	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
5A	1A760				X							PRCS-PASSIVATION OF BERYLLIUM	A
4A	1A962			X								PROC SPEC,BONDING W/EPOXY ADHESIVE	B
10A	1A842			X								MACH&STRESS REL BERYL,PROC	A
4A	1A843			X								HANDLING OF BERYLLIUM PARTS	A
3A	1A863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1F	43991		1									SECONDARY MIRROR ASSY-VISSR-GCES	D
1D	44319			1								MIR & MIR SPRT,MATCHED,SEC MIR	F
/	44319-99				1							MIRROR,SECONDARY(MA FR 43675-1)	F
1D	43675-1					1						MIRROR,SECONDARY-VISSR/SMS-GOFS	E
/	43675-99						1					MIRROR,SECONDARY(MAKE FROM 24619)	E
1D	24619							AR				BERYLLIUM STOCK,SECONDARY MIRROR	B
11A	1A834							X				BERYL BLOCK,VAC HOT PRESSED	E
5A	1A760							X				PRCS-PASSIVATION OF BERYLLIUM	A
20A	1A761							X				PRCS SPEC-OPTICAL SYSTEM	G

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ORIGINAL PAGE IS
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SIZE DRAWING NO.		NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
4A	1A843						X					HANDLING OF BERYLLIUM PARTS	A
10A	1A842						X					MACH&STRESS REL BERYL,PROC	A
20A	1A761						X					PRCS SPEC-OPTICAL SYSTEM	G
/	44319-98				1							SUPPORT,MIRROR(MAKE FROM 44597)	F
1D	44597					1						MIRROR SPT,SEC VISSR	B
10A	1A842						X					MACH&STRESS REL BERYL,PROC	A
4A	1A762						X					CHROMIC ACID ANODIZING BERYL	A
/	44319-97				3							SPRING,MIRROR SPRT(MA FR 44598)	F
1D	44598					1						SPRING,MIR SPRT-SEC MIRROR	D
1C	44600				3							NUTPLATE,SECONDARY MIRROR MOUNT	A
1C	44549			1								NUT, SECONDARY MIRROR MOUNT	A
1C	44550			1								BALL JOINT,SECONDARY MIRROR MOUNT	A
1D	44555			1								FLANGE,ADJT,SEC MIRROR MT	B
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1C	44556			3								SCREW,DIFFERENTIAL	A
1C	44557			3								PLUNGER,SECONDARY MIRROR MOUNT	A
1C	44586			3								SCR,HSG,SECONDARY MIRROR MNT	B
/	44586-99				1							SCREW	B
/	44586-98				1							PIN	B
1D	44587			1								PLATE ADJ SEC SEC MIR MOUNT	B
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44588			1								PLATE ADJUSTABLE,SECONDARY MIRROR	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44601			1								BAFFLE SEC MIRROR MOUNT	C
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1C	46796			1								TARGET,SECONDARY MIRROR	B
4A	1A962			X								PROC SPEC,BONDING W/EPOXY ADHESIVE	B
11A	19107			X								PROC-GEN MECH ASSY OF THE VISSR	C
1D	44973		1									NUT,ADJ,SECONDARY MIR MT	B
1F	44532		1									SCAN MIRROR SUPPORT ASSY-SCANNER	F
1F	44217			1								FRAME,SUPPORT,SCAN MIRROR	B
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44223			2								ARM ATTACHING BALANCE SCANNER	C
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	45270			2								ARM MOUNTING SCAN MIRROR	B
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	453A0			1								ARM BEARING SHAFT SCAN MIRROR	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44225			1								RAP FIVOT SCAN MIRROR	B
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1C	45044			2								SHIELD BEARING SCAN MIRROR	A
1C	45039			2								SPRING LOAD BEARING SCAN MIR	A
1C	45045			2								RETAINER BEARING OUTSIDE RACE	A
1B	44228			1								BEARING,DUPLX PAIR-SCANNER(SCD)	E
3A	19046				X							PRCMT SPEC-PRG,BALL-SPACED DUPL PR	E
1C	45053			1								CAP RETAINER SCAN MIRROR	B
4A	1A843				X							HANDLING OF BERYLLIUM PARTS	A
10A	1A842				X							MACH&STRESS REL BERYL,PROC	A
11A	19107				X							PROC-GEN MECH ASSY OF THE VISSR	C
4A	1A862				X							PROC SPEC,BONDING W/EPOXY ADHESIVE	B
1F	44320		1									SCAN MIRROR MOUNT ASSY	G
1F	43676-1			1								MIRROR,SCAN-VISSR/SMS-GOES	F
/	43676-99				1							MIRROR,SCAN(MAKE FROM 24620)	F
1D	24620					AR						BERYLLIUM STOCK,SCAN MIR	A
11A	1A834						X					BERYL BLOCK,VAC HOT PRESSED	E
5A	1A760						X					PRCS-PASSIVATION OF BERYLLIUM	A
20A	1A761						X					PRCS SPEC-OPTICAL SYSTEM	G
4A	1A843					X						HANDLING OF BERYLLIUM PARTS	A
10A	1A842					X						MACH&STRESS REL BERYL,PROC	A
20A	1A761					X						PRCS SPEC-OPTICAL SYSTEM	G
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
1D	44219			1								MOUNT,MIRROR-POSITION 1	A
/	44219-99				1							MOUNT	A
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	44220-1			1								MOUNT,MIRROR-POSITION 4	B
/	44220-99				1							MOUNT	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	44220-2			1								MOUNT,MIRROR-POSITION 2	B
/	44220-99				1							MOUNT	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	44221			1								MOUNT, MIRROR, POS NO. 3	A

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
/	44221-99				1							MOUNT	A
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	44226			4								CUP, BEARING, SCAN MIR SUPPORT	A
1D	44227			4								SHAFT BEARING SCAN MIR SUPPORT	A
1D	44222			4								BEARING,BALL,DUPLEX PR-SCNR(SCD)	A
3A	19045				X							SPEC-BEARING,BALL-DUPLEX PR	C
1C	44554			4								RETAINER RAFF BEARING INSIDE	A
1C	44553			4								RETAINER, RING, BEARING, OUTSIDE	A
1F	45769			12								NUTPLATE-VISSR/SMS	A
4A	1A962			X								PROC SPEC,ROUNDING W/EPOXY ADHESIVE	B
1C	45493	1										ARMATURE ASSY	A
1D	45466		1									HSG,ELECTROMAGNETIC ARMATURE	C
/	45466-99				1							HOUSING	C
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45619		1									ARMATURE COPE	B
1C	45464		2									BUSHING SPRING	A
1B	45527		2									SHAFT SPRING	A
1C	45465		2									SPRING HELICAL COMPRESSION	A
1C	45462	1										MOUNT STOP ASSY SCAN MIRROR REST	D
1D	44961		1									MOUNT SCAN MIRROR RESTRAINT	C
1F	44960		1									TUBE SPACER	A
1C	44962		1									STOP SCAN MIRROR RESTRAINT	A
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	44963	1										SOLENOID,EM-VISSR/GOES(SCD)	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
6A	19080				X							PRCMT SPEC,STOW ASSY	C
2F	45019	1										COVER,CAVITY,SCANNER-VISSR/GOES	H
/	45019-99		1									COVER	H
/	45019-98		1									STRAP	H
/	45019-97		1									STRAP	H
/	45019-96		1									STRAP	H
/	45019-95		1									STRAP	H
/	45019-94		1									STRAP	H
1D	45494		1									WELL MOUNTING SCANNER	A
4A	1A962				X							PROC SPEC,ROUNDING W/EPOXY ADHESIVE	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
3A	19048				X							PRCS-APPL OF WHITE EPOXY COATING	C
1D	45020	1										RING,SUPPORT COVER	G
3A	19048				X							PRCS-APPL OF WHITE EPOXY COATING	C
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D

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VISSR SCANNER ASSY

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	49479		1									COVER, AFT-VISSR/GOES SCANNER	C
3A	1A063			Y								PRCS-APPL OF FLAT BLACK PAINT	D
2D	45022		1									SHADE, SUN-SCANNER	F
/	45022-99			1								SHADE, SUN	F
1C	47061			1								HOLDER, BOOT	A
1C	47099			1								BOOT	A
1B	47060			1								LOCK, LATCH	A
1D	26547			X								COVER ASSY-DETACHABLE SUN SHADE	E
11A	19107			X								PROC-GEN MECH ASSY OF THE VISSR	C
3A	1A063			X								PRCS-APPL OF FLAT BLACK PAINT	D
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1C	45495-1		1									JUNCTION BOX ASSY	L
1D	49344			1								JUNCTION BOX-VISSR/GOES SCANNER	A
3A	19048				X							PRCS-APPL OF WHITE EPOXY COATING	C
13A	10104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45809			1								CABLE ASSY-STOW, SCNR (W3)	D
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
2F	29784				X							FIX, SCNR CABLE, ENCDR, W1&J7	A
1F	29906				X							WRG AID DWG, SCNR CA, ENCDR (W1&J7)	A
1F	45811			1								CABLE ASSY-VISIBLF, SCNR	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
2F	29782				X							FIX, SCNR CABLE ASSY, COOLER END	A
1F	29908				X							WRG AID DWG, SCNR CA, CLR END	A
1D	45810			1								CABLE ASSY-SCAR COOLER (W4)	D
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
2F	29782				X							FIX, SCNR CABLE ASSY, COOLER END	A
1F	29908				X							WRG AID DWG, SCNR CA, CLR END	A
1D	45807			1								CABLE ASSY-PRI ENCDR SCNR (W1)	E
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
4A	19970				X							IDENTIFICATION OF BULK ITEMS	A
2F	29784				X							FIX, SCNR CABLE, ENCDR, W1&J7	A
1F	29906				X							WRG AID DWG, SCNR CA, ENCDR (W1&J7)	A
1D	45812			1								CABLE ASSY-FOCUS SCANNER (W6)	D
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
2F	29782				X							FIX, SCNR CABLE ASSY, COOLER END	A
1F	29908				X							WRG AID DWG, SCNR CA, CLR END	A
1D	45813			1								CABLE ASSY-THERMAL, SCNR (W7)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
2F	29782				X							FIX, SCNR CABLE ASSY, COOLER END	A
1F	29908				X							WRG AID DWG, SCNR CA, CLR END	A

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ORIGINAL PAGE IS
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	46533		1									CABLE ASSY-REDUNDANT ENCD SCNR	F
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
1F	29783			X								FIX,SCNR CABLE,ENCDR(W2)	A
1F	29907			X								WRG AID DWG,SCNR CA,ENCDR(W2)	A
1D	47147		1									COVER, JUNCTION BOX	A
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1F	47142		2									TERMINAL RD ASSY,LAMP REG,VLTG	H
1C	47667			1								TRANSISTOR(MAKE FR 2N3752)	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
20A	19179				X							XSTR,SILICON,HI PWR,2N3752	D
1D	47152			1								TERMINAL BOARD,LAMP REGULATOR	B
/	47152-99					1						BOARD	B
1D	47153			1								BRACKET,TERMINAL BOARD	B
9A	19971			X								PRCS SPEC-CONF CTG W/SOLITHANE	A
28A	19975			X								GOES ELEC AUTH PTS,ALT, & X-REF LIST	M
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
1C	47144			X								ELECT DIAG-LAMP REGULATOR,VOLTAGE	C
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
28A	19055			X								TEST PROC-VTSSR ELECT SUBASSYS	N
1B	49867		1									KIT,CONN SAVER CABLES	A
1D	27186			1								WEAR CABLE ASSY(W101)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27187			1								WEAR CABLE ASSY(W103)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27188			1								WEAR CABLE ASSY(W104)	D
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1F	27189			1								WEAR CABLE ASSY(W105)	C
/	27189-99					2						JUNCTION SHELL(MAKE FROM DD24661)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27190			1								WEAR CABLE ASSY(W106)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27191			1								WEAR CABLE ASSY(W107)	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	27192			1								WEAR CABLE ASSY(W102)	C
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1C	47478		2									PLATE, NUT, LOCKING	C
4A	19962		X									PROC SPEC,BONDING W/EPOXY ADHESIVE	B
9A	19971		X									PRCS SPEC-CONF CTG W/SOLITHANE	A

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
14A	19049			X								SPOT BONDING FLECT COMPONENTS	D
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1F	44195		2									ENCODER, TORQUE MOTOR, BRG ASSY(SCD)	E
1C	45431			X								BEARING, BALL-SPACED DUPL PAIR(SCD)	B
9A	19088				X							BEARING, BALL-DUPLEX PR	F
1D	50162			ALT								SP DUPL BALL PRG ASSY(ALT/45431)	A
/	50162-99			2								RING, OUTER	A
/	50162-98			2								RING, INNER	A
/	50162-97			2								SEPARATOR	A
/	50162-92			ALT								SEPARATOR(ALT/50162-97)(M/F 50106)	A
1C	50106					1						SEPARATOR, BEARING	D
/	50162-96			2								SHIELD	A
/	50162-95			72								BALL	A
/	50162-94			1								SPACER, OUTER	A
/	50162-93			1								SPACER, INNER	A
1C	45431				X							BEARING, BALL-SPACED DUPL PAIR(SCD)	B
1D	70448				X							ENCODER BEARING ASSY TOOL	A
7A	15869				X							PROC-RF SPTX LUB ANTIFRICTN BRGS	A
4A	15868				X							PROC-ASSY, PRECOND SP BRG DUPL PR	B
35A	19056			X								PRCMT SPEC-ENCODR, TORQUE MTR & MSB	L
9A	19088			X								BEARING, BALL-DUPLEX PR	F
7A	19017			X								HI-SPEED BURNISH ANTIFRICTN BRGS	C
3A	15580			X								PL, GCS STATIC SENS ITEMS	A
9A	19088			X								GSPEC PROT NT SENS ELEC PTS & EQPT	C
1D	46017		1									SUN CALIB ASSY - VISSR	C
1D	46644			1								HANGAR, PRISM MT, SUN CALIB	B
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1F	46019			1								MOUNT, PRISM, SOLAR CALIBRATOR	A
1D	46020			1								PRISM, SOLAR CALIBRATOR	B
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	46021			2								PRISM, DOVE, SOLAR CALIBRATOR	A
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	46022			2								CLAMP, DOVE PRISM, SOLAR CALIBRATOR	B
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	46023			1								CLAMP, PRISM, SOLAR CALIBRATOR	B
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	47268-1			1								SHIELD, DOVE PRISM	A
1C	47268-2			1								SHIELD, DOVE PRISM	A
4A	18962			X								PROC SPEC, BONDING W/EPOXY ADHESIVE	B
3A	18863			X								PRCS-APPL OF FLAT BLACK PAINT	D

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REV H

NUMBER

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VISSR SCANNER ASSY

SHEET

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ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	45819		1									TROUGH, CABLE-SCANNER	D
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1C	45818		1									CLAMP, CABLE-VISSR/SMS SCNR	B
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1D	45820		1									SUPPORT CABLE TROUGH SCANNER	B
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1D	45821		1									MOUNT CABLE TROUGH SCANNER	B
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1D	45817		1									RETAINER CABLE SCANNER	A
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1C	43937		3									MIRROR, ALHMT-VISSR/SMS-GOES SCNR	F
1D	44298		1									FRAME & BRACKET ASSY-SCANNER	H
1F	44344			1								FRAME PRIMARY MIRROR	C
10A	1A842				X							MACH&STRESS REL BERYL, PROC	A
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
1D	44343			3								BRACKET, TANGENTIAL	B
1F	43671-1			1								MIRROR, PRIMARY-VISSR/SMS-GOES	E
/	43671-99				1							MIRROR, PRIMARY (MAKE FROM 24617)	E
1D	24617					AR						BERYLLIUM STOCK, PPI MIR	A
11A	1A834						X					BERYL BLOCK, VAC HOT PRESSED	E
5A	1A760						X					PRCS-PASSIVATION OF BERYLLIUM	A
20A	1A761						X					PRCS SPEC-OPTICAL SYSTEM	G
4A	1A843					X						HANDLING OF BERYLLIUM PARTS	A
10A	1A842					X						MACH&STRESS REL BERYL, PROC	A
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
20A	1A761					X						PRCS SPEC-OPTICAL SYSTEM	G
1B	45528			3								PIN PRIMARY MIRROR SCANNER	B
1B	45940-1		AR									WEIGHT, SLUG SCANNER	B
1B	45940-2		AR									WEIGHT, SLUG SCANNER	B
1C	45890-2		1									WEIGHT, BALANCE-SCANNER	D
3A	1A863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1C	45891		2									WEIGHT, BALANCE, UPPER-SCANNER	C
3A	1A863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1D	45040		1									WEIGHT, BALANCE, RIGHT-SCANNER	B
3A	1A863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1D	45939		1									WEIGHT, BALANCE, LEFT-SCANNER	B
3A	1A863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1B	45900-1		1									GROMMET ALIGNMENT	B
1B	45900-2		1									GROMMET ALIGNMENT	B
1C	45767		1									PROTECTIVE COVER	A

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VISSR SCANNER ASSY

SHEET

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ORIGINAL PAGE IS
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	A	9		
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1B	49340		2									SPACER, POSITIONING-SCANNER	A
1D	45770		1									CONNECTOR WFL	C
3A	1A863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1C	45949		1									CUP ASSEMBLY	A
1D	45795			1								CUP, CONNECTOR-VISSR/SMS SCNR	B
/	45795-99				1							CUP	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
3A	19048				X							PRCS-APPL OF WHITE EPOXY COATING	C
1B	45A94			2								CAP SCREW SCANNER	A
1C	45A93			2								SCR, CAPTIVE	B
1D	46253		1									RING, SPCT, DFT & FOC-VISSR/SMS	A
2F	49373		1									RAD COOLER & THERMAL DETECTOR ASSY	F
1F	45030			1								ADAPTER, RADIATION COOLER	D
4A	1A762				X							CHROMIC ACID ANODIZING BERYL	A
10A	1A842				X							MACH&STRESS REL BERYL, PROC	A
3A	19048				X							PRCS-APPL OF WHITE EPOXY COATING	C
1F	45533			1								PREAMP MOUNT BRACKET-SCANNER	F
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45031			1								SHIM, RADIATION COOLER	C
1C	456A4			1								NUTPLATE-SCANNER	C
1C	45009			2								COVER THERMAL PREAMP SCANNER	A
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1B	45008			8								SPACER PREAMP MTG SCANNER	C
/	49373-99			AR								INSUL, HT SHRK, .187ID, MIL-I-23053/B	F
/	49373-98			AR								FILM, PLASTIC, .001, MIL-P-46112	F
1B	46717			1								GASKET, PURGE	A
2D	45010-1			2								PWB ASSY-THERMAL PREAMP	R
1F	45011				1							PWB-THERMAL PREAMP	G
/	45011-99					1						BOARD, PL SH LAM	G
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
2D	45012				X							MSTR ARTWK-THERMAL PREAMP	C
7A	19973				X							SCRN SPEC-JANTX/JANTXV XSTRS	C
4A	19479				X							ADJ PROC, THERM PREAMP REG	A
18A	19083				X							SCREENING SPECS-TRANSISTORS	H
4A	19970				X							IDENTIFICATION OF BULK ITEMS	A
15A	191A0				X							SILICON N-CHAN FIELD EFFECT XSTR	D
28A	19975				X							GOS ELEC AUTH PTS, ALT, & X-REF LIST	M
9A	19971				X							PRCS SPEC-CONF CTG W/SOLITHANE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D

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VISSR SCANNER ASSY

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ORIGINAL PAGE IS
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1F	44288				X							ELEC DIAG-THERMAL PREAMP	H
28A	19055				X							TEST PROC-VISSR ELEC SUBASSYS	N
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
3A	15580				X							PL,GOES STATIC SENS ITEMS	A
9A	19808				X							GSPEC PROT ST SENS ELEC PTS & EQPT	C
3F	46200		1									RADIATION COOLER ASSY	L
1D	46184			1								COVER ASSY,FILTER	A
1B	45152				1							FILTER BANDPASS THERMAL	B
6A	19077					X						SPEC-FILTER,BANDPASS-THRML CHNL	A
1D	46105				1							COVER,FILTER	C
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
3A	18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1C	46268				1							FILTER-MOUNT	B
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
7A	19257					X						INSP,CLNG&HOLG REGT-SMS RADN CLR	B
4A	18962					X						PROC SPEC,BONDING W/EPOXY ADHESIVE	B
1F	46186		1									FIRST STAGE ASSY	G
1F	46183			1								HOUSING,COOLER	H
/	46183-99				1							HOUSING	H
3A	19865					X						PRCS SPEC-STABLZN HT TRMT ALALYS	A
3A	18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
3A	19048					X						PRCS-APPL OF WHITE EPOXY COATING	C
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
1D	46197				3							SUSPENSION BAND ASSY	D
1C	46198-1				1							BAND,SUSPENSION	F
4A	19255					X						PROC SPEC FOR BAND,SUSPENSION	D
5A	19247					X						PRCS SPEC APL VAC-DEP AU COATINGS	C
1C	46198-2				1							BAND,SUSPENSION	F
4A	19255					X						PROC SPEC FOR BAND,SUSPENSION	D
5A	19247					X						PRCS SPEC APL VAC-DEP AU COATINGS	C
1D	46201				1							FITTING,MAIN SUPPORT	C
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
1B	46202-1				1							FITTING,BAND SUSPENSION	E
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
1B	46202-2				1							FITTING, BAND SUSPENSION	E
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
1C	46203					4						SHLDR BUSHING,SPMSN BAND	A
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G
1B	46385					4						SCREW	A
4A	18920					X						GOLD PLATING,LOW EMITTANCE SURF	G

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VISSR SCANNER ASSY

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ORIGINAL PAGE IS
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1R	46474-5					4						WASHER, PLATED (MAKE FROM NAS620C8L)	A
1C	46199				3							NUT, SUPPORT FITTING	A
1C	46217				3							RING, CAM	A
1D	46272				1							FIRST STAGE HOUSING ASSY	D
2F	46187					1						HOUSING, FIRST STAGE	C
4A	1A920						X					GOLD PLATING, LOW FMITTANCE SURF	G
1C	46293					1						SKIRT, HOUSING	F
4A	1A920						X					GOLD PLATING, LOW FMITTANCE SURF	G
7A	19257						X					INSP, CLNG&HDLG RECT-SMS RADN CLR	B
1D	46219					1						RING, HOUSING	B
4A	1A920						X					GOLD PLATING, LOW FMITTANCE SURF	G
1D	46190					1						PLATE, INSULATION SUPPORT	E
4A	1A920						X					GOLD PLATING, LOW FMITTANCE SURF	G
1R	46474-1					6						WASHER, PLATED (MAKE FROM NAS620C0)	A
1D	46158					1						HEATER ASSY-FIRST STAGE (SCD)	J
1C	44979						1					PLATE, HEATER	F
4A	1A920						X					GOLD PLATING, LOW FMITTANCE SURF	G
8A	19019						X					APP SOL 113/300 CONF COAT	B
14A	19049						X					SPOT PONDING ELECT COMPONENTS	D
4A	19302						X					PRCS-BOND 1ST STG SHLDX HSG ASSYS	C
4A	19970						X					IDENTIFICATION OF BULK ITEMS	A
6A	19410						X					PRCS-SELECT STRIP POLYIMIDE INSUL	C
13A	19104						X					IDENT OF DETAIL PTS & ASSYS	B
6A	19157						X					APPL OF MULTILAYER INSUL-RAD CLR	B
1D	26783						X					TEMPLATE-FIRST STAGE INSULATION	A
1D	26784						X					TEMPLATE-INSUL 1ST STAGE RADIATOR	A
1C	46274					3						WASHER, ANTI-ROTATION	A
1C	46275					3						LOCKNUT, CAM	A
1C	46287					3						LOCKNUT, FITTING	A
1B	46472					6						SCREW, PLATED (MA FR NAS1100C06-5)	A
1B	46474-4					6						WASHER, PLATED (MAKE FROM NAS620C6)	A
1C	27080						X					BASE, ALIGNMENT HOUSING 1ST STAGE	A
1R	26905						X					WRENCH, LOCK NUT	B
2F	26652						X					FIXTURE, FIRST STAGE TENSION	C
4A	1A962						X					PROC SPEC, BONDING W/EPOXY ADHESIVE	B
7A	19257						X					INSP, CLNG&HDLG RECT-SMS RADN CLR	B
1D	46189				1							CLAMP, RADIATOR	E
3A	1A863						X					PRCS-APPL OF FLAT BLACK PAINT	D
1D	46192				1							RADIATOR ASSY-FIRST STAGE	F
/	46192-99					1						HONEYCOMB	F

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VISSR SCANNER ASSY

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ORIGINAL PAGE IS
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SIZE DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
	0	1	2	3	4	5	6	7	8	9		
1D 46193					1						RADIATOR, FIRST STAGE	F
4A 1A920						X					GOLD PLATING, LOW EMITTANCE SURF	G
3A 19245					X						EPOXY BONDING ALUM HONEYCOMB	A
3A 1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
7A 19257					X						INSP, CLNG&HOLG RECT-SMS RADN CLR	B
1D 26569					X						FIXT, 1ST STAGE HONEYCOMB INSTL	A
1D 46194			1								SHIELD ASSY, FIRST STAGE	A
1D 46042					1						SHIELD, 1ST STAGE, VISSR/SMS-GOES	C
4A 1A921						X					PRCMT SPEC-FIRST STAGE SHIELD	C
1C 46195					1						RING, HEAT XFER	B
4A 1A920						X					GOLD PLATING, LOW EMITTANCE SURF	G
1D 46196					1						FLANGE, SUPPORT	C
4A 1A920						X					GOLD PLATING, LOW EMITTANCE SURF	G
1C 46264					1						RETAINER, HT XFER	A
4A 1A920						X					GOLD PLATING, LOW EMITTANCE SURF	G
4A 19302					X						PRCS-POND 1ST STG SHLDXHSR ASSYS	C
1C 26606					X						FIXTURE ASSY, RING TO SHIELD	A
7A 19257					X						INSP, CLNG&HOLG RECT-SMS RADN CLR	B
1F 47024-1			1								SECOND STAGE ASSY (BAND SUSP)	F
1D 46895-1					1						DEWAR HOUSING ASSY (BAND SUSP)	G
1F 45667-1						1					SHELL, DEWAR SUPPORT (BAND SUSP)	E
4A 1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1B 45668						6					SCREW, BAND SUPPORT	B
4A 1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1C 45669						6					CLEVIS, 2ND STAGE BAND	C
4A 18920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1B 45670						6					BUSHING, BAND	B
4A 1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1B 45671						6					SCREW, CLEVIS	C
4A 1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1B 45672						6					SCREW, TENSION	C
4A 1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1B 45673						6					SCREW, ADJUSTING	C
4A 1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1C 46678-3						3					BAND, SUSPENSION - SECOND STAGE	A
5A 19298							X				SPEC FOR BAND, SUSPENSION, 2ND STAGE	D
5A 19247							X				PRCS SPEC APL VAC-DEP AU COATINGS	C
1C 46678-4						3					BAND, SUSPENSION - SECOND STAGE	A
5A 19298							X				SPEC FOR BAND, SUSPENSION, 2ND STAGE	D
5A 19247							X				PRCS SPEC APL VAC-DEP AU COATINGS	C

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VISSR SCANNER ASSY

REV H

NUMBER ACL 44345-2

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ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	46894						1					HOUSING, BAND SUPPORT	D
4A	1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1B	47027						9					STRIP, HOLE COVER	A
7A	19257							X				INSP, CLNG & HCLG REQT-SMS RADN CLR	B
2D	27099						X					STRIP INST FIX, 2STG	A
2F	26584						X					TENSION FIXT, 2ND STAGE	C
1D	26560						X					FIXT, SECOND STAGE ASSY	B
4A	1A962						X					PROC SPEC, BONDING W/EPOXY ADHESIVE	B
7A	19257						X					INSP, CLNG & HCLG REQT-SMS RADN CLR	B
1F	46041					1						DEWAR/CABLE ASSY	J
1F	45512						1					HG-CD-TE DETECTOR/DEWAR ASSY	H
1C	44904							1				WINDOW ASSY	H
/	44904-99								1			BODY, GLASS 7520	H
1B	44905								1			WINDOW, DEWAR	C
1B	44906								1			FLANGE, KOVAR	D
18A	1A849							X				PROC SPEC, HGCOTE DET/DEWAR ASSY	F
1B	44907							1				COLD SHIELD	F
6A	19353							X				PAINT, GLOSS BLACK, EPOXY, APL OF	B
2D	44978							1				HEATER ASSY-2ND STAGE(SCD)	J
1C	44909								1			HOUSING-2ND STAGE HEATER	K
4A	1A920							X				GOLD PLATING, LOW EMITTANCE SURF	G
1D	45229								1			SLEEVE ASSY-HEAT TRANSFER	E
1B	45397									1		PLUG, SLEEVE	D
1B	45398									2		SLEEVE	C
1C	45399									1		FLANGE, SLEEVE	C
3A	1A863							X				PRCS-APPL OF FLAT BLACK PAINT	D
1D	45444								1			DETECTOR MOUNT ASSY	F
1D	44910									1		STEM ASSY, DEWAR	L
/	44910-99									1		GLASS TUBE, TYPE 7052	L
/	44910-98									1		GLASS TUBE, TYPE 7052	L
/	44910-97									1		GLASS TUBE, TYPE 7052	L
/	44910-96									4		PIN, KOVAR .040 DIA X .37 LG	L
/	44910-95									2		PIN, KOVAR .040 DIA X .56 LG	L
/	44910-94									1		PLATFORM 7052 GLASS	L
1B	44908									1		FLANGE, STEM	C
4A	19092								X			GETTER HANDLING INSTAL & FIRING	R
2C	2A958								X			VIBRATION FIXTURE, STEM ASSY	A
4A	19428								X			PROC SPEC-VTB ACC TEST VISSR DEWAR	B
3A	19352								X			PS BMDG DET SUBSTRATE & COLD SHLD	B
1F	26219								X			ALNMT FIXT, DET-DEWAR, VISSR/GOES	D

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VISSR SCANNER ASSY

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
4A	15407								X			DETECTOR SUBSTRATE PRELIM TEST	A
20A	19246							X				FINAL ACC PROC-HGCOTE DET/DEWAR	G
1D	27096							X				VIBRATION FIXTURE, DEWAR ASSY	B
1C	20957							X				CLAMP, DETECTOR/DEWAR TEST	A
5A	19979							X				DETECTOR-DEWAR VACUUM BAKE SCHED	A
1R	29490							X				FIXTURE, HEATER ASSY	B
7A	19257							X				INSP, CLNG&HDLG RECT-SMS RADN CLR	B
3A	15415							X				HELIUM LEAK TEST PROC	A
4A	19253							X				PRCS SPEC-SOPR MAG WIRE/KOVAR PIN	C
18A	10049							X				PROC SPEC, HGCOTE DET/DEWAR ASSY	F
4A	19390							X				BONDG W/SPACE GRADE ENCAPS	C
4A	19092							X				GETTER HANDLING INSTAL & FIRING	B
4A	19173							X				DEWAR FLANGE WELDING PROC	B
3A	19352							X				PS BNDG DFT SUBSTRATE&COLD SHLD	B
2F	46221						1					CABLE ASSY, THERMAL COOLER	N
1C	46220							1				PLATE-ELECT CONNECTOR	A
4A	1A920								X			GOLD PLATING, LOW EMISSANCE SURF	G
1C	46292							1				BRKT, TERMINAL	C
4A	1A920								X			GOLD PLATING, LOW EMISSANCE SURF	G
1C	46294							1				BOARD, STRAIN RELIEF	B
1B	46218							1				MOUNT, W SPRT	A
4A	1A920								X			GOLD PLATING, LOW EMISSANCE SURF	G
1R	46212-1							1				ROD, SUPPORT	D
7A	19257								X			INSP, CLNG&HDLG RECT-SMS RADN CLR	B
1B	49542							1				BRACKET, CABLE SUPPORT	B
4A	1A920								X			GOLD PLATING, LOW EMISSANCE SURF	G
7A	19257							X				INSP, CLNG&HDLG RECT-SMS RADN CLR	B
5A	19424							X				BONDG W/THERMAL CONDUCTIV EPOXY	A
14A	10049							X				SPOT BONDING ELECT COMPONENTS	D
6A	19410							X				PRCS-SELECT STRIP POLYIMIDE INSUL	C
8A	19019							X				APP SOL 113/300 CONF COAT	B
4A	19970							X				IDENTIFICATION OF BULK ITEMS	A
1F	29785							X				FIXTURE-DEWAR WIRING	A
1B	46216						1					BLOCK, SENSOR MOUNTING	C
3A	1A863							X				PRCS-APPL OF FLAT BLACK PAINT	D
1C	45930							1				SENSOR	A
9A	19161							X				PRCMT SPEC-PLAT RES TEMP SENSORS	C
1R	46208							1				BUSHING, ROD SUPPORT	C
1B	27323							X				ROD LOCATING BLOCK	B
14A	19049							X				SPOT BONDING ELECT COMPONENTS	D

TITLE
VISSR SCANNER ASSY

REV H

NUMBER ACL 44345-2

SHEET 16

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.		NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
5A	19424						X					BONDC W/THERMAL CONDUCTIV EPOXY	A
5A	19608						X					PS-POTTING PAD CLF TEMP SENSOR	A
8A	19019						X					APP SOL 113/300 CONF COAT	B
1P	27323						X					ROD LOCATING BLOCK	B
1B	46208					1						RUSHING, ROD SUPPORT	C
1D	46209					1						RADIATOR ASSY, SECOND STAGE	A
1D	46210						1					RADIATOR, SECOND STAGE	C
4A	19920							X				GOLD PLATING, LOW EMISSANCE SURF	G
3A	18863						X					PRCS-APPL OF FLAT BLACK PAINT	D
7A	19257						X					INSP, CLNG&HDLG RECT-SMS RADN CLR	B
3A	19245						X					EPOXY BONDING ALUM HONEYCOMB	A
1B	46470-1					3						SCREW, PLTD (MAKE FROM LL1352C02-3)	B
1B	46473					3						WASHER, BLACK (MAKE FROM NAS620C2)	A
1P	46474-2					1						WASHER, PLATED (MAKE FROM NAS620C2)	A
1B	46709					3						WASHER, PLATED	A
1D	47048					3						DAMPER ASSY, 2ND STAGE (SCD)	D
1C	47049						1					STANT-OFF, 2ND STAGE DAMPER	A
1B	47050						1					CORE, 2ND STAGE DAMPER	A
1C	47051						1					RING, 2ND STAGE DAMPER	A
13A	19427						X					MATL SPEC-RUBBER, SILICONE, DAMPING	B
1D	47052					1						WEIGHT, DAMPER-2ND STAGE	C
1B	46291					1						DISK, DEFINING APERTURE	D
4A	18920							X				GOLD PLATING, LOW EMISSANCE SURF	G
1B	47434						AR					SHIM, 2ND STAGE DAMP	A
1C	45930					1						SENSOR	A
9A	19161							X				PRCMT SPEC-PLAT RES TEMP SENSORS	C
1B	46216					1						BLOCK, SENSOR MOUNTING	C
3A	18863							X				PRCS-APPL OF FLAT BLACK PAINT	D
1B	27335						X					MOUNTING FIXTURE-2ND STAGE	A
1B	27086						X					WRENCH, DAMPER	B
5A	19608						X					PS-POTTING PAD CLF TEMP SENSOR	A
3F	46200						X					RADIATION COOLER ASSY	L
5A	19424						X					BONDC W/THERMAL CONDUCTIV EPOXY	A
4A	19970						X					IDENTIFICATION OF BULK ITEMS	A
7A	19257						X					INSP, CLNG&HDLG RECT-SMS RADN CLR	B
4A	18962						X					PROC SPEC, BONDING W/EPOXY ADHESIVE	B
14A	19049						X					SPOT BONDING ELECT COMPONENTS	D
1B	47377					12						SCREW, SHLD DAMPER-M/F NAS1352C04H6	B
1B	47378					12						WASHER, SHIELD DAMPER	A
1C	46273					1						APERTURE PLATE ASSY	D

TITLE

REV H

NUMBER

ACL 44345-2

VISSR SCANNER ASSY

SHEET

17

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1C	46191-1					1						WINDOW, APERTURE(SCD)	C
1D	46207					1						PLATE, APERTURE	D
4A	1A920						X					GOLD PLATING, LOW EMITTANCE SURF	G
3A	1A963						X					PRCS-APPL OF FLAT BLACK PAINT	D
7A	19257					X						INSP, CLNG&HDLG RECT-SMS RADN CLR	B
4A	199A1					X						PRCS SPEC-ASSY APERTURE PLT	B
1D	46470		1									COVER ASSY, 1ST STAGE	C
1D	46188					1						COVER, FRST STG	B
4A	1A920						X					GOLD PLATING, LOW EMITTANCE SURF	G
7A	19257						X					INSP, CLNG&HDLG RECT-SMS RADN CLR	B
6A	19157					X						APPL OF MULTILAYER INSUL-RAD CLR	B
1D	26780					X						TEMPLATE, INSUL FIRST STAGE COVER	A
1B	46480			18								WASHER, PLATED(MA FR MS15795-802)	A
1B	46474-2			26								WASHER, PLATED(MAKE FROM NAS620C2)	A
1B	46474-1			8								WASHER, PLATED(MAKE FROM NAS620C0)	A
1B	46470-2			17								SCREW, PLTD(MAKE FROM LL1352C02-6)	B
1B	46709			8								WASHER, PLATED	A
1B	46805			4								WASHER, TAPFRED	A
1D	47068			1								SHIELD ASSY	C
1F	44656-1			1								SHIELD, RADIATION COOLER	H
5A	1A898					X						PRCMT SPEC-RADIATION COOLER SHIELD	C
3A	19048					X						PRCS-APPL OF WHITE EPOXY COATING	C
1D	47030			12								DAMPER ASSY, SHIELD	B
1C	47031					1						HOUSING, OUTER-SHIELD DAMPER	A
1B	47032					1						TUBE, INNER-SHIELD DAMPER	A
13A	19427					X						MATL SPEC-RUBBER, SILICONE, DAMPING	B
2D	47445					1						SEAL, SHIELD(SCD)	B
7A	19257					X						INSP, CLNG&HDLG RECT-SMS RADN CLR	B
3A	19533					X						PROC SPEC-INST OF BONDED SEAL	B
1C	28955					X						FIXTURE-SEAL INSTALLATION	A
1C	28956			X								FIXTURE, 2ND STAGE SOLDERING	A
1F	26764			X								RING, RADIATION COOLER HEATER	A
1D	28959			X								VIB FIXT, COOLER ASSY ON ADAPTER	A
8A	19584			X								VIBR SHKDN PROC-RAD COOLER ASSY	C
1C	26561			X								APERTURE PLATE LOCATING FIXTURE	D
1C	26607			X								FIXTURE ASSY, DEWAR ALIGNMENT	A
4A	18962			X								PROC SPEC, BONDING W/EPOXY ADHESIVE	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
7A	19257			X								INSP, CLNG&HDLG RECT-SMS RADN CLR	B
11A	19107			X								PROC-GEN MECH ASSY OF THE VISSR	C

TITLE

REV H

NUMBER

ACL 44345-2

VISSR SCANNER ASSY

SHEET

18

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
	0	1	2	3	4	5	6	7	8	9		
7A 19249				X							ALNMT PROC, THERM DET ON RAD COOLER	C
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
13A 19355				X							TEST PROC, VISSR RAD COOLER	E
8A 19019				X							APP SOL 113/300 CONF COAT	B
11A 19107			X								PROC-GEN MECH ASSY OF THE VISSR	C
9A 19971			X								PRCS SPEC-CONF CTG W/SOLITHANE	A
4A 19970			X								IDENTIFICATION OF BULK ITEMS	A
14A 19049			X								SPOT BONDING ELECT COMPONENTS	D
1D 46503			X								WIP DIAG, RAD COOLER & THERM DET	E
10A 19010			X								CONNECTOR, FILTER PIN	F
3A 155A0			X								PL, GOES STATIC SENS ITEMS	A
9A 19988			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C
1B 46435-1	1										NUT, JAM	A
1B 46435-2	1										NUT, JAM	A
1B 46448	2										WASHER, FWD ARM-VISSR/SMS	A
4F 49347	1										VISIBLE DETECTOR & FOCUS ASSY	J
1C 45523		1									HOUSING, LAMP HOLDER-SCANNER	B
3A 19063			X								PRCS-APPL OF FLAT BLACK PAINT	D
1C 45524		1									TUBE, LENS FRONT-SCANNER	E
3A 19063			X								PRCS-APPL OF FLAT BLACK PAINT	D
1C 45525		1									TUBE, LENS REAR-SCANNER	B
3A 19063			X								PRCS-APPL OF FLAT BLACK PAINT	D
1D 44998		8									PWR ASSY, VISIBLE PREAMP	M
1D 44999			1								PWR-VISIBLE PREAMP	G
/ 44999-99				1							BOARD, PLASTIC SHEET LAM	G
2D 45000				X							MSTR ARTWK-VISIBLE PREAMP	E
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
28A 19975				X							GOES ELEC AUTH PTS, ALT, & X-REF LIST	M
9A 19971				X							PRCS SPEC-CONF CTG W/SOLITHANE	A
10A 19082				X							SCREENING SPEC DICES	C
18A 19083				X							SCREENING SPECS-TRANSISTORS	H
1D 44275				X							ELEC DIAG-VISIBLE PREAMP	G
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
6A 19422				X							TEST PROC VISIBLE PREAMP STABILITY	C
4F 49347				X							VISIBLE DETECTOR & FOCUS ASSY	J
28A 19055				X							TEST PROC-VISSR ELECT SUBASSYS	N
1D 45005		1									BRACKET, CONNECTOR-SCANNER	D
/ 45005-99				1							BRACKET	D
3A 19863				X							PRCS-APPL OF FLAT BLACK PAINT	D

TITLE
VISSR SCANNER ASSY

REV H

NUMBER ACL 44345-2

SHEET 19

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1D	49377		1									CALIBRATION SHUTTER ASSY	B
1D	44424			1								ACTUATOR, CALIB SHUTTER(SCD)	C
9A	1A970				X							PKCMT SPEC-CALIBRATION SHUTTER	C
1F	49556			ALT								BI-STABLE ACTUATOR(ALT FOR 44424)	A
1F	49553			1								ROTOR ASSY, BI-STABLE ACTUATOR	A
1D	49543					1						SHAFT, ROTOR ASSY	A
1C	49545					1						POLEPIECE, ROTOR ASSY	B
1C	49546					2						MAGNET, ROTOR ASSY	A
1C	49549					1						CLAMP WASHER, ROTOR ASSY	A
1D	49527					1						BEARING, BALL-ANNULAR(SCD)	A
3A	15425						X					PRCMT SPEC-BEARING, BALL-ANNULAR	A
1B	49526					1						BEARING, BALL-ANNULAR(SCD)	A
3A	15424						X					PRCMT SPEC-BEARING, BALL-ANNULAR	A
2A	15466						X					PROC SPEC-BONDG W/EPOXY RESIN	A
1F	49555				1							STATOR ASSY	B
1D	49554					1						STATOR WNDG, BI-STABLE ACTUATOR	A
1D	49544							1				STATOR, BI-STABLE ACTUATOR	B
1C	49547							1				COIL GROUP, STATOR WINDING	A
1F	49552							1				REAR HOUSING, STATOR ASSY	A
1C	49550							2				INSULATOR, STATOR ASSY	A
1C	49551							1				WASHER, STATOR ASSY	A
3A	15467						X					PROC SPEC-POTING W/CLEAR ENCPSLNT	A
1F	49548					1						FRONT HOUSING, BI-STABLE ACTUATOR	A
11A	19107					X						PROC-GEN MECH ASSY OF THE VISSR	C
1D	46444				1							SHUTTER-VISSR/SMS SCANNER	B
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1D	49405					2						THERMISTOR, PRECISION(SCD)	A
7A	19212						X					SCREENING SPEC-THERMISTORS	D
14A	19049					X						SPOT BONDING ELECT COMPONENTS	D
9A	19971					X						PRCS SPEC-CONF CTG W/SOLITHANE	A
4A	19970					X						IDENTIFICATION OF BULK ITEMS	A
1C	45855				1							HLDR, FIBER OPTICS	B
1D	45842				1							DOVETAIL, FIBER OPTICS-VISSR	A
1F	44426				1							TURE, RAFFLE-SCANNER	B
/	44426-99					1						TURE, RAFFLE	B
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1C	45046				3							SPACER BAFFLE SCANNER	B
/	45046-99					1						SPACER BAFFLE	B
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1C	45047-1				1							STOP, RAFFLE-SCANNER	B

TITLE

REV H

NUMBER

ACL 44345-2

VISSR SCANNER ASSY

SHEET

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ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45047-2			1								STOP,BAFFLE-SCANNFR	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45047-3			1								STOP,BAFFLE-SCANNFR	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45047-4			1								STOP,BAFFLE-SCANNFR	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1D	45048			1								NUT,BAFFLE-SCANNER	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1F	49334			1								MOUNT,BAFFLE TUBE	A
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
2F	45082-3			1								FIBER OPTICS ASSY(SCD)	L
/	45082-27				10							FIBER OPTICS	L
12A	19011				X							PRCMT SPEC-FIBER OPTICS ASSY	D
1F	45051			1								RING MOUNTING FIBER OPTICS	C
/	45051-99				1							RING MOUNTING	C
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45052-1				8							FERRULE,FIBER OPTICS-SCANNER	C
1C	45054-1				8							BLOCK,FIBER END,FIBER OPTICS	B
1C	45055				1							FERRULE FIBER OPTICS DUAL SCANNER	A
1C	45056				1							CAP BELLOW SCANNER	B
/	45056-99					1						CAP BELLOW SCANNER	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45064				1							MOUNT ALIGNMENT TUBE SCANNER	A
1C	45066				1							PRISM,FIBER OPTICS-SCANNER	B
/	45066-99					1						PRISM	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
1C	45083				1							BELLOWS,FIBER ROUTING(SCD)	D
1C	46619				1							ALIGNMENT TUBE,FIBER	B
1C	45216				1							BRKT BELLOW MT FIBER OPTICS	A
1C	25147				1							BRACKET SUPPORT MOUNT SCANNER	A
1B	25148				1							CLAMP MOUNT SCANNER	A
1C	25265				1							PLATE MOUNTING SCANNER	B
1B	25311				3							SPACER SCANNER	A
12A	19011				X							PRCMT SPEC-FIBER OPTICS ASSY	D
3A	19004				X							PRCS SPEC-BOND W/TRANSP EPOXY ADH	B
4A	1A962				X							PRCS SPEC-BONDING W/EPOXY ADHESIVE	B
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
13A	19104				X							IDFNT OF DETAIL PTS & ASSYS	B
1D	45058-1			8								PRISM & PMT ASSY-SCANNER(SCD)	D

TITLE

REV H

NUMBER

ACL 44345-2

VISSR SCANNER ASSY

SHEET

21

ORIGINAL PAGE IS
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SIZE DRAWING NO.		NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1C	44284				1							PMT & HV SUPPLY-SCANNER(SCD)	K
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
24A	19960					X						PRCMT SPEC-INTEG PMT & HVPS	C
1D	49361				1							PRISM - PRISM&PMT ASSY	B
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
3A	19004					X						PRCS SPEC-ROND W/TRANSP EPOXY ADH	B
1F	45060			1								COVER PMT VIS DET FOC ASSY	C
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1F	49360			1								THERMAL CHANNEL FOCUS DRIVE ASSY	C
1D	44486-1				1							DRIVE ASSY-MATCHER	D
/	44486-98					1						TUBE, FOCUSING(MAKE FROM 44119)	D
1F	44119						1					TUBE, FOCUSG-THRM CHAN FCS DR	D
5A	1A862						X					APPL OF BONDED SOLID FILM LUB	A
5A	1A760						X					PRCS-PASSIVATION OF BERYLLIUM	A
/	44486-97					1						GEAR, NUT(MAKE FROM 43961)	D
1D	43961						1					GEAR, NUT THERML CHAN FOC DRIVE	A
5A	1A862						X					APPL OF BONDED SOLID FILM LUB	A
5A	1A760						X					PRCS-PASSIVATION OF BERYLLIUM	A
/	44486-96					2						BUSHING(MAKE FROM 43990)	D
1B	43990						1					BUSHING	A
5A	1A862						X					APPL OF BONDED SOLID FILM LUB	A
5A	1A760						X					PRCS-PASSIVATION OF BERYLLIUM	A
/	44486-95					1						SEAL INSTL(MAKE FROM 44359-1)	D
1C	44359-1						1					SEAL INSTALLATION-BLANK HSG(SCD)	C
/	44359-99										AR	SEAL	C
1F	44047-1						1					HOUSING & COVER, LINE BORING	F
/	44047-99							1				PLATE BEARING(MAKE FROM 43977)	F
1C	43977								1			PLATE, BEARING-THRM CHAN FOC DRIVE	A
10A	1A842									X		MACH&STRESS REL PERYL, PROC	A
10A	1A842									X		MACH&STRESS REL PERYL, PROC	A
4A	1A762									X		CHROMIC ACID ANODIZING BERYL	A
/	44047-97								1			COVER, BLANK(MAKE FROM 44035)	F
1F	44035									1		COVER, HOUSING BLANK	A
10A	1A842									X		MACH&STRESS REL BERYL, PROC	A
10A	1A842									X		MACH&STRESS REL BERYL, PROC	A
4A	1A762									X		CHROMIC ACID ANODIZING BERYL	A
/	44047-96								1			HOUSING, BLANK(MAKE FROM 49346)	F
2F	49346									1		HOUSING, BLANK, THERM CHAN FOC DR	A
10A	1A842										X	MACH&STRESS REL BERYL, PROC	A
10A	1A842										X	MACH&STRESS REL BERYL, PROC	A

TITLE

REV H

NUMBER

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VISSR SCANNER ASSY

SHEET

22

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
4A	1A762									X		CHROMIC ACID ANODIZING BERYL	A
10A	1A042									X		MACH&STRESS REL BERYL,PROC	A
4A	1A762									X		CHROMIC ACID ANODIZING BERYL	A
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
5A	1A760							X				PRCS-PASSIVATION OF BERYLLIUM	A
5A	1A862					X						APPL OF BONDED SOLID FILM LUB	A
5A	1A760					X						PRCS-PASSIVATION OF BERYLLIUM	A
1C	44230		1									SEAL,INSTLN,THRML CHAN FOC DR(SCD)	B
/	44230-99			2								SEAL	B
1C	439A1			1								SHFT SEAL ASSY,FRNT,THRM CH FOC DP	C
1C	43973					1						ADAPTER,BELLOWS-THRM CHN FOC DR	C
1C	44027					1						SEAL,SHAFT-THERM CHANNEL FOC DRIVE	E
3A	19004							X				PRCS SPEC-BOND W/TRANSP EPOXY ADH	B
1C	44229-1		1									SEAL INSTLN-THRML CHAN FOC DR(SCD)	C
/	44229-99			2								SEAL	C
1C	43980-1			1								SHFT SEAL,REAR,THRM CHAN FOC DRIVE	D
1C	43969					1						ADAPTER,BELLOWS-THRM CHN FOC DR	C
1C	43979					1						SEAL,SHAFT-THERM CHNL FOCUS DRIVE	C
1B	49337					1						ROD,PULL-VISSR/GOES SCANNER	D
1B	49339					1						ROD,PUSH-VISSR/GOES SCANNER	A
3A	19004							X				PRCS SPEC-BOND W/TRANSP EPOXY ADH	B
1D	44118		1									LENS,RELAY,THRML CHAN FOC DR(SCD)	A
1D	44116		1									LENS,PLY,FRONT,THRM CH FOC DR(SCD)	A
1D	44213		1									LENS,CL-THERM CHNL FOC DR	E
1C	44115		1									RETAINER,LENS-THRML CHAN FOC DRIVE	A
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1B	44211		1									SPACER,LENS-THRML CHAN FOC DRIVE	B
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1C	43946		1									SHAFT,PINION-THRML CHNL FOC DR	B
5A	1A862					X						APPL OF BONDED SOLID FILM LUB	A
1C	43959		1									GEAR,1ST STAGE THRM CHNL FOC DR	B
5A	1A862					X						APPL OF BONDED SOLID FILM LUB	A
1B	43987		1									WASHER	A
1B	43978		1									WASHER-THRML CHAN FOCUS DRIVE	A
1B	44212		1									PIN,ALIGN-THRML CHAN FOC DRIVE	A
1D	43939		1									MOTOR,STEPPER	D
8A	1A852					X						PROC SPEC,MOTOR STEPPER	C
1C	45075		1									STOP,THRM CHAN FOC DR-VISSR/SMS	B
3A	1A863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1B	46500		1									GASKET,LENS	A

TITLE
VISSR SCANNER ASSY

REV H

NUMBER ACL 44345-2

SHEET 23

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1B	43941			2								BEARING,BALI-ANNULAR	A
3A	1A851				X							PRCMT SPEC-BEARING,BALL,ANNULAR	B
1C	43942			2								BEARING, BALL-ANNULAR	A
3A	1A850				X							PRCMT SPEC-BEARING,BALI,ANNULAR	B
1C	49345			2								SWITCH,PLUNGER ACTUATED(SCD)	A
11A	1A863				X							SWITCH,SPDT,PLUNGER ACT,HERMET SLD	A
1B	49348				AR							NUT,JAM-VISSR/GOES SCANNER	A
1B	42993				16							SCREW,SOC HD(MA FR NAS1352C02-3)	A
1B	49698				AR							SPCR,LIM SW-THERM CHNL FOCUS DR AS	A
3A	1A863				X							PRCS-APPL OF FLAT BLACK PAINT	D
6A	1A854				X							MANUAL BURNISH ANTIFRICTION RRGs	B
11A	19307				X							PROC-GEN MECH ASSY OF THE VISSR	C
4A	1A862				X							PROC SPEC,BONDING W/EPOXY ADHESIVE	B
1F	49359		1									VISIPLE CHANNEL FOCUS DRIVE ASSY	A
1B	42978			1								WASHER-THRM CHAN FOCUS DRIVE	A
1C	44140			1								GEAR,PINION,VISIPLE CHANNEL FOC DR	D
5A	1A862				X							APPL OF BONDED SOLID FILM LUB	A
1D	44185				1							MOTOR,STEPPER	E
8A	1A868				X							PROC SPEC,MTR STEPPER	D
1C	44993-1			1								SEAL INSTL SHAFT SEAL ASSY	B
1C	44143-1				1							SHAFT SEAL ASSY,VIS CHANNEL FOC DR	D
1C	44139					1						ADAPTER,BELLOWS,VIS CHNL FOC DRIVE	B
1C	44142					1						SHAFT SEAL,VIS CHANNEL FOCUS DRIVE	C
3A	19004					X						PRCS SPEC-BOND W/TRANSP EPOXY ADH	B
1C	44993-2			1								SEAL INSTL SHAFT SEAL ASSY	B
1C	44143-2				1							SHAFT SEAL ASSY,VIS CHANNEL FOC DR	D
1C	44139					1						ADAPTER,BELLOWS,VIS CHNL FOC DRIVE	B
1C	44142					1						SHAFT SEAL,VIS CHANNEL FOCUS DRIVE	C
3A	19004					X						PRCS SPEC-BOND W/TRANSP EPOXY ADH	B
1D	45068-1				1							DRIVE ASSY,MATCHET,VIS CHAN FOC DR	B
/	45068-95					1						HSG CVR LINE BORE(MA FR 45069-1)	B
1D	45069-1						1					HOUSING COVER,VIS CHAN FOCUS FR	B
/	45069-96							1				HOUSING,BLANK(MAKE FROM 49335)	B
1F	49335								1			HOUSING,BLANK,VIS CHAN FOCUS DRIVE	B
10A	1A842								X			MACH&STRESS REL BERYL,PROC	A
10A	1A842								X			MACH&STRESS REL BERYL,PROC	A
4A	1A762								X			CHROMIC ACID ANODIZING BERYL	A
/	45069-98									1		PLATE BEARING(MAKE FROM 44138)	B
1C	44138									1		PLATE BEARING VIS CHAN FOCUS DR	B
10A	1A842										X	MACH&STRESS REL BERYL,PROC	A

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ORIGINAL PAGE IS
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
10A	1A842								X			MACH&STRESS REL RERYL,PROC	A
4A	1A762								X			CHROMIC ACID ANODIZING BERYL	A
/	45069-97							1				COVER BLANK(MAKE FROM 45071)	B
1F	45071								1			COVER BLANK VIS CHAN FOCUS DR	B
10A	1A842								X			MACH&STRESS REL RERYL,PROC	A
10A	1A842								X			MACH&STRESS REL RERYL,PROC	A
4A	1A762								X			CHROMIC ACID ANODIZING BERYL	A
10A	1A842							X				MACH&STRESS REL RERYL,PROC	A
4A	1A762							X				CHROMIC ACID ANODIZING BERYL	A
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
/	45068-98							1				SCREW LEAD(MAKE FROM 45074)	B
1C	45074							1				SCREW LEAD VIS CHAN FOCUS DR	A
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
/	45068-97							1				GEAR NUT(MAKE FROM 44141)	B
1C	44141							1				GEAR NUT VIS CHAN FOCUS DR	C
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
/	45068-96							2				BUSHING(MAKE FROM 45072)	B
1B	45072							1				BUSHING SCANNER	A
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
1C	45073							1				GEAR FIRST STAGE VIS CHAN FOC DR	B
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
1B	45079							1				WASHER VIS CHAN FOCUS DR	A
1D	45206							1				SHAFT PINION VIS CHAN FOC DR	B
5A	1A862							X				APPL OF BONDED SOLID FILM LUB	A
1B	47081							1				SCREW,ADJ-FOC DR	A
1C	47082							1				STOP,FOCUS DRIVE-VISSR/SMS	A
3A	1A863							X				PRCS-APPL OF FLAT BLACK PAINT	D
1C	49345							2				SWITCH,PLUNGER ACTUATED(SCO)	A
11A	1A563							X				SWITCH,SPDT,PLUNGER ACT,HERMET SLD	A
1B	49338							2				PLUNGER,SWITCH ACTUATOR	A
1B	44181							2				BEARING,BALL-ANNULAR	B
3A	1A867							X				PRCMT SPEC-BEARING,BALL,ANNULAR	B
1B	43941							2				BEARING,BALL-ANNULAR	A
3A	1A851							X				PRCMT SPEC-BEARING,BALL,ANNULAR	B
1B	40348							4				NUT,JAM-VISSR/GOES SCANNER	A
1B	43993							3				SCREW,SOC HD(MA FR NAS1352C02-3)	A
4A	1A962							X				PROC SPEC,BONDING W/EPOXY ADHESIVE	B
6A	1A854							X				MANUAL BURNISH ANTIFRICTION BRGS	B
3A	1A863							X				PRCS-APPL OF FLAT BLACK PAINT	D

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ORIGINAL PAGE IS
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SIZE DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
	0	1	2	3	4	5	6	7	8	9		
11A 19107				X							PROC-GEN MECH ASSY OF THE VISSR	C
1C 45925			1								CLAMP, DOVETAIL-VISSR/SMS	C
3A 18863				X							PRCS- PPL OF FLAT BLACK PAINT	D
1D 45061			1								PLATE ASSY	C
1F 45062				1							PLATE VISIBLE DET AND FOC SCANNER	F
10A 18842					X						MACH-STRESS REL RFRYL, PROC	A
4A 18762					X						CHROMIC ACID ANODIZING RERYL	A
1B 45063-1					16						STANCOFF PMT SCANNER	C
1B 45063-2					16						STANCOFF PMT SCANNER	C
4A 18962					X						PROC SPEC, BONDING W/EPOXY ADHESIVE	B
1C 45520			1								LAMP HOLDER ASSY SCANNER	B
1D 45522				1							LAMP SCANNER	E
/ 45522-99					1						BASE LAMP	E
1C 45521				1							HOLDER LAMP SCANNER	A
3A 19130					X						PS BONDING W/CLEAR SILICONE ADH	A
1D 46816			8								SHIELD, PMT, WELDMENT	B
/ 46816-99				1							SHIELD, PMT, FLAT (MAKE FROM 46815)	B
1D 46815					1						SHIELD, PMT, FLAT	B
3A 18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
1C 46436-1			1								SENSOR ASSY, TEMP	D
1B 45532-2				1							TERMINAL SENSOR	B
1D 49405				1							THERMISTOR, PRECISION (SCD)	A
7A 19212					X						SCREENING SPEC-THERMISTORS	D
14A 19049					X						SPOT BONDING ELECT COMPONENTS	D
1C 45078			1								HOLDER OPTICAL FOCUS DR	B
1C 45463			1								BRACKET, ACTUATOR	A
3A 18863					X						PRCS-APPL OF FLAT BLACK PAINT	D
4A 19970				X							IDENTIFICATION OF BULK ITEMS	A
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1J 46714				X							WIR DIAG, VIS DET & FOC ASSY	F
20A WL49347				X							WIRE LIST-VISIBLE DET & FOCUS ASSY	B
1C 25147				X							BRACKET SUPPORT MOUNT SCANNER	A
1B 25148				X							CLAMP MOUNT SCANNER	A
1C 25265				X							PLATE MOUNTING SCANNER	B
1B 25311				X							SPACER SCANNER	A
3A 18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
9A 19971				X							PRCS SPEC-CONF CTC W/SOLITHANE	A
4A 18962				X							PROC SPEC, BONDING W/EPOXY ADHESIVE	B
5A 19168				X							TEST PROC INTEGR PHOTOSENSOR	B
1J 26332				X							PMT ALIGNMENT FIXTURE	B

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
6A	19422			X								TEST PROC VISIRLE PREAMP STABILITY	C
10A	19515			X								VIS DET & FOC ASSY CHECK-VISSR	B
9A	192A0			X								PROC-OPT ALNMT,VIS DET & FOC ASSY	E
10A	19010			X								CONNECTOR,FILTER PIN	F
1C	46043-1		AR									SHIM,SCAN MIRROR	A
1C	46043-2		AR									SHIM,SCAN MIRROR	A
1C	46043-3		AR									SHIM,SCAN MYRROP	A
1C	46099-5		AR									NAMEPLATE-VISSR/GCES SCANNER	C
1C	46099-6		AR									NAMEPLATE-VISSR/GCES SCANNER	C
1C	46436-1		2									SENSOR ASSY,TEMP	D
1B	45532-2			1								TERMINAL SENSOR	B
1D	49405			1								THERMISTOR,PRECISION(SCD)	A
7A	19212				X							SCREENING SPEC-THERMISTORS	D
14A	19049			X								SPOT BONDING FLECT COMPONENTS	D
1C	45890-1		1									WEIGHT,BALANCE-SCANNER	D
3A	18863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1B	45940-3		AR									WEIGHT,SLUG SCANNER	B
1B	46730		1									BRACKET,LATCH-SCANNER	D
3A	18863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1F	47249		2									GROMMET-CABLE,SCANNER	A
1C	47040		2									ARM ASSY,FORWARD	B
1B	47038			1								ARM,FORWARD	C
3A	18863				X							PRCS-APPL OF FLAT BLACK PAINT	D
3A	19130			X								PS BONDING W/CLEAR SILICONE ADM	A
1C	47041		2									ARM ASSY,AFT	B
1B	47039			1								ARM,AFT FORWARD	C
3A	19130			X								PS BONDING W/CLEAR SILICONE ACH	A
1B	46296-4		AR									WEIGHT,45 DFG ARM	D
3A	18863			X								PRCS-APPL OF FLAT BLACK PAINT	C
1B	46296-5		AR									WEIGHT,45 DFG ARM	D
3A	18863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1B	46296-6		AR									WEIGHT,45 DFG ARM	D
3A	18863			X								PRCS-APPL OF FLAT BLACK PAINT	D
1F	47382		1									OUTER THERMAL BLANKET	A
1C	47381		6									STUD,FASTENER,INSUL BLKT	A
1C	47380		6									WASHER,SHOULDER,INSUL BLKT	A
1B	47426		1									INSULATOR - SCANNER	B
1D	47700		1									SWITCH,BSC-VISSR/GCES SCANNER(SCD)	D
1B	47A38-1		2									GROMMET,ENCODER VISSR/SMS SCANNER	A
1B	47A38-2		2									GROMMET,ENCODER VISSR/SMS SCANNER	A

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ORIGINAL PAGE IS
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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
1C	49701		1									SHIM, ENCDR	A
3F	46200		X									RADIATION COOLER ASSY	L
1F	45030		X									ADAPTER, RADIATION COOLER	D
1C	45031		X									SHIM, RADIATION COOLER	C
1F	49471		X									OPTICAL SCHEM-VISSR/GOES SCANNER	A
1C	46568		X									WIRING DIAG, SENSOR & STOW	E
11A	19107		X									PROC-GEN MECH ASSY OF THE VISSR	C
4A	18962		X									PROC SPEC, BONDING W/EPOXY ADHESIVE	B
8A	19281		X									TEST PROC-SPIN BALANCE	A
14A	19049		X									SPOT BONDING FLECT COMPONENTS	D
3A	18863		X									PRCS-APPL OF FLAT BLACK PAINT	D
3E	46008		X									VISSR SCANNER (ICD)	B
5A	WI 44345-2		X									WIRE LIST-SENSOR & STOW	A
1C	26795		X									LATCH ASSY, SCAN MIRROR STOW	C
9A	19971		X									PRCS SPEC-CONF CTG W/SOLITHANE	A
2D	49414		X									TEST CONFIGURATION LIST-VISSR/GOES	F
4A	19970		X									IDENTIFICATION OF BULK ITEMS	A
13A	19610		X									DET PROC-INST&ALNMT OPT/HSG & CHK	B
4A	19479		X									ADJ PROC, THERM PREAMP REG	A
2J	45094		X									ELECTRONICS MODULE ASSY (UNIT 2)	Y
10A	19119		X									GEN PADLG SHPG&CONTAM CONT RQTS	B
4A	19405		X									EPOXY ADHESIVE BONDING SPEC	A
19A	19145		X									INITIAL CHANNEL ALNMT-VISSR/GOES	D
4A	19299		X									ASSY & CL.1 TEST, TELESCOPE PORTION	C
3A	15500		X									PL, GOES STATIC SENS ITEMS	A
9A	19888		X									GSPEC PROT ST SENS ELEC PTS & EQPT	C

NOTE: An asterisk (*) appearing in the Revision Letter column on the preceding pages identifies a released but unincorporated change to the listed document. The data contained within each released E.O. is included in this ACL. Each affected document, its current revision letter and released outstanding E.O.(s) are listed below.

DRAWING NO.	REV	APPLICABLE E.O. NO(s)
	LTR	
44345	R	4668

In addition, the following listed documents have an unincorporated change in process as indicated by the applicable ECR number.

DRAWING NO.	REV	APPLICABLE ECR NO(s)
	LTR	
19055	N	426/01
45094	Y	475/01R1 (End-Of-Contract Effectivity)

TITLE VISSR SCANNER ASSY REV H. NUMBER ACL 44345-2 SHEET 28

SBRC

Appendix D

VISSR/GOES ELECTRONIC MODULE ASSEMBLY, ACL 45094-2

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MODEL EFFECTIVITY	REVISIONS			
	SYM	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE	20 DEC 1974	
RECORD	B	COMPLETELY REVISED PER ECR 304/03	20 MAR 1975	
RECORD	C	COMPLETELY REVISED PER ECR 421/03	26 JUN 75	
RECORD	D	COMPLETELY REVISED PER ECR 459/03	18 SEP 75	
RECORD CHANGE	E	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 489/02	19 Dec 75	
RECORD CHANGE	F	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 524/02	29 Mar 76	
RECORD CHANGE	G	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 535/02	11 June 76	
RECORD CHANGE	H	Revised & updated as req'd to reflect current status of all drawings. As req'd by ECR 551/02	13 Sep 76	

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SPECIFY THE REVISION LEVEL TO USE

CONTRACT NO. NAS5-20660		SANTA BARBARA RESEARCH CENTER A Subsidiary of Hughes Aircraft Company GOLETA, CALIFORNIA	
PREPARED <i>[Signature]</i> CHECKED <i>[Signature]</i> APPROVED <i>[Signature]</i> APPROVED	18 DEC 74 12/17/74 12/14/74	TITLE ELECTRONICS MODULE ASSEMBLY VISSR/GOES	
SIZE A		CODE IDENT NO. 11323	NUMBER ACL 45094-2
SCALE <i>[Signature]</i> 12-19-74		SHEET 1 OF 14	

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WL45094	11 13													
15580	4 5	6	7	8	9	10	13							
15738	8 10													
18962	12													
19010	11 13													
19048	2													
19049	2 3	4	5	6	7	8	9	10	11	12	13			
19055	4 5	6	7	8	9	10	11							
19071	2 3	4	5	6	8	9	13							
19075	7 9													
19078	8 13													
19079	7													
19082	8													
19104	2 3	4	5	6	7	8	9	10	11	12	13			
19160	2													
19179	4 5	12												
19180	7 9													
19212	12													
19259	2													
19282	2 13													
19394	4 5													
19449	6													
19888	4 5	6	7	8	9	10	11	13						
19970	2 4	5	6	7	8	9	10	11	12	13				
19971	2 4	5	6	7	8	9	10	10	12	13				
19973	4 5	6	7	8	9	10								
19974	2 4	5	6	7	8	9	10							
19975	4 5	6	7	8	9	10	11							
27114	13													
27244	13													
27247	13													
28384	13													
29954	13													
44732	9													
44901	7													
44969	9													
44996	11													
44997	6													
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45097	2													

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45098	2	
45099	2	
45103	8	
45104	8	
45105	8	
45110	3	4
45112	3	5
45117	9	
45118	9	
45119	9	
45122	10	
45123	10	
45124	9	
45125	9	
45126	9	
45131	7	
45132	7	
45133	7	
45134	8	
45135	8	
45136	8	
45137	6	
45138	6	
45139	6	
45140	6	
45141	4	5
45143	3	4
45144	3	4
45145	3	4
45191	3	4
45192	3	5
45193	6	
45194	3	4
45195	3	4
45197	10	
45198	3	4
45200	6	
45210	3	5
45211	8	
45233	6	

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DRAWING NO.	SHEET	INDEX											
45451	7												
45472	3	5											
45532	12												
45641	2												
45708	11												
46028	11												
46029	12												
46030	12												
46064	2												
46070	11												
46097	11												
46266	2												
46269	11												
46345	3	5											
46381	12												
46436	12												
46747	12												
46904	12												
47090	7	8	9										
47097	3	5	6	7	8	9	10	11	12				
47100	3	5	6	7	8	9	10						
47135	3	5											
47137	4	5											
47251	4	5											
47257	2												
47258	2												
47259	2												
47269	12												
47355	12												
47545	6												
47552	2												
47575	13												
47576	11												
47577	11												
47578	11												
47580	11												
47581	11	12											
47627	11												
47667	12												
47779	10												

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1. 3

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INDEX

DRAWING NO.	SHEET
477A0	10
4A0A0	13
49362	10
49363	10
49364	10
49365	10
49379	4 5
49405	12
49458	11
49462	12 13
49734	6
49735	6
49736	6
49737	6
49738	6

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ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
2J	45094-2	1										ELECTRONICS MODULE ASSY(UNIT 2)	Y
2F	45097		1									HOUSING ASSY,ELECTRONICS MODULE	N
/	45097-99			1								HOUSING	N
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
4A	19160			X								STANNATE IMRS TRTMT, APPL OF	A
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
1D	45098		1									COVER,WIRING-ELEC MODULE	C
4A	19160			X								STANNATE IMRS TRTMT, APPL OF	A
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1D	45099		1									COVER,TOP ELECT MODULE	H
/	45099-99			1								COVER	H
/	45099-98			2								SHIM,INDIUM,99.99 PCT PURE	H
1D	46266			1								PAD,TOP COVER-ELEC MOD	C
5A	19259				X							MAT'L SPEC-RUBBER,MLD SH,SIL TYPE	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1R	46064-1			1								PAD,TOP COVER-ELEC MOD	C
5A	19259				X							MAT'L SPEC-RUBBER,MLD SH,SIL TYPE	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1R	46064-2			2								PAD,TOP COVER-ELEC MOD	C
5A	19259				X							MAT'L SPEC-RUBBER,MLD SH,SIL TYPE	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
3A	19048			X								PRCS-APPL OF WHITE EPOXY COATING	C
4A	19160			X								STANNATE IMRS TRTMT, APPL OF	A
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1J	47259		1									PWR ASSY-INTERCONNECTION	F
1F	47258			1								PWR-INTERCONNECTION	F
/	47258-99				1							BOARD,PL SH LAM	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
2F	47257				X							MSTR ARTWK-INTERCONNECTION BOARD	E
1D	45641			1								CHOKE FILTER	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
10A	19071				X							SPEC-XFMRS,REACTORS,AUD FREQ&PWR	F
9A	19971				X							PRCS SPEC-CONE CTC W/SOLITHANE	A
2A	19974				X							CONN,PLUG & RECEPT,ELEC,PRTD CKT	A
4A	19970				X							IDENTIFICATION OF BULK ITEMS	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1J	47552				X							ELEC DIAG-INTERCONNECTION BOARD	E
37A	19282				X							TEST PROCEDURE VISSR ELECT MODULE	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B

TITLE

REV H

NUMBER

ACL 45094-2

ELECT MODULE ASSY

SHEET

2

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
3F	45110-1		1									PWR ASSY, POWER SUPPLY (A1)	U
1F	45194			1								PWR-POWER SUPPLY	E
/	45194-99				1							BOARD, PL SH LAM	E
1E	45195				X							MSTR ARTWORK PWR SUPPLY A18A2	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	45191			1								HEATSINK, XSTR	A
/	45191-99				1							HEATSINK	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	45143			1								COVER, PWR SUPPLY	A
/	45143-99				1							COVER	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45144			1								CHOKE MAIN LINE	E
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ&PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
2D	45145			1								TRANSFORMER, POWER	N
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ&PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45198			1								HEATSINK POWER SUPPLY	F
/	45198-99				1							HEATSINK	F
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1F	46345			2								WASHER, SHIM-POWER SUPPLY	B
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	45210			2								RETAINER, HEAT SINK	D
/	45210-99				1							RETAINER	D
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45192			1								CHOKE, FILTER	C
10A	19071				X							SPEC-XFMRS, REACTORS, AUD FREQ&PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45472			3								CHOKE, FILTER (SCD)	C
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ&PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45112			1								TRANSFORMER, SATURATING	D
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ&PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	47100			11								TERMINAL, CLINCH PIN, TURRET	A
1C	47097-2			7								TERMINAL, INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	47135			1								CHOKE, FILTER	B

TITLE
ELECT MODULE ASSY

REV H

NUMBER ACL 45094-2

SHEET 3

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ & PWR	F
1C	47137			1								TERMINAL BOARD	A
/	47137-99				1							BOARD	A
1C	47251			1								GROUND STRAP, POWER SUPPLY	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1B	49379			2								INSULATOR TUBE	A
9A	19971			X								PKCS SPEC-CONF CTG W/SOLITHANE	A
2A	19974			X								CONN, PLUG & RECEPT, ELEC, PRD CKT	A
28A	19975			X								GOFS ELEC AUTH PTS, ALT, & X-REF LIST	M
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
20A	19179			X								XSTR, SILICON, HI PWR, 2N3752	D
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
6A	19394			X								EMBEDDIT DIODE IN HT SINK-SOLITHM	A
1F	45141			X								ELEC DIAG-POWER SUPPLY(A1,A2)	L
3A	19580			X								PL, GOES STATIC SENS ITEMS	A
9A	19908			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C
3F	45110-2	1										PWB ASSY, POWER SUPPLY(A2)	U
1F	45194			1								PWR-POWER SUPPLY	E
/	45194-99				1							BOARD, PL SH LAM	E
1E	45195				X							MSTR ARTWORK PWR SUPPLY A1&A2	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	45191			1								HEATSINK, XSTR	A
/	45191-99				1							HEATSINK	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	45143			1								COVER, PWR SUPPLY	A
/	45143-99				1							COVER	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45144			1								CHOKE MAIN LINE	E
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ & PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
2D	45145			1								TRANSFORMER, POWER	N
10A	19071				X							SPEC-XFMRS, REACTOPS, AUD FREQ & PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	45198			1								HEATSINK POWER SUPPLY	F
/	45198-99				1							HEATSINK	F
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D

TITLE

REV H

NUMBER

ACL 45094-2

ELECT MODULE ASSY

SHEET

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ORIGINAL PAGE IS
OF POOR QUALITY

SIZE DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
	0	1	2	3	4	5	6	7	8	9		
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1B 46345			2								WASHER, SHIM-POWER SUPPLY	B
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C 45210			2								RETAINER, HEAT SINK	D
/ 45210-99				1							RETAINER	D
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D 45192			1								CHOKE, FILTER	C
10A 19071				X							SPEC-XFMRS, REACTORS, AUD FREQ&PWR	F
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D 45472			3								CHOKE, FILTER (SCD)	C
10A 19071				X							SPEC-XFMRS, REACTORS, AUD FREQ&PWR	F
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D 45112			1								TRANSFORMER, SATURATING	D
10A 19071				X							SPEC-XFMRS, REACTORS, AUD FREQ&PWR	F
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C 47097-2			6								TERMINAL, INSUL BASE	A
/ 47097-99				1							BASE	A
14A 19049				X							SPOT BONDING ELECT COMPONENTS	D
1C 47100			10								TERMINAL, CLINCH PIN, TUPRET	A
1D 47135			1								CHOKE, FILTER	B
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
10A 19071				X							SPEC-XFMRS, REACTORS, AUD FREQ&PWR	F
1C 47137			1								TERMINAL BOARD	A
/ 47137-99				1							BOARD	A
1C 47251			1								GROUND STRAP, POWER SUPPLY	A
13A 19104				X							IDENT OF DETAIL PTS & ASSYS	B
1B 49379			2								INSULATOR TIRE	A
9A 19971			X								PRCS SPEC-CONF CTC W/SOLITHANE	A
2A 19974			X								CONN, PLUG & RECEPT, ELEC, PRIO CKT	A
28A 19975			X								GOES ELEC AUTH PTS, ALT, & X-REF LIST	M
4A 19970			X								IDENTIFICATION OF BULK ITEMS	A
7A 19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
20A 19179			X								XSTR, SILICON, HI PWR, 2N3752	D
14A 19049			X								SPOT BONDING ELECT COMPONENTS	O
28A 19055			X								TEST PROC-VTSSR ELECT SUBASSYS	N
13A 19104			X								IDENT OF DETAIL PTS & ASSYS	B
6A 19394			X								EMBEDMT DIODE IN HT SINK-SOLITHANE	A
1F 45141			X								ELEC DIAG-POWER SUPPLY (A1, A2)	L
3A 15590			X								PL, GOES STATIC SENS ITEMS	A
9A 19888			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C

TITLE
ELECT MODULE ASSY

REV H

NUMBER ACL 45094-2

SHEET 5

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
3F	45137											PWR ASSY-SCAN DRIVE LOGIC(A3,A5)	*
1F	45139			1								PWR-SCAN DRIVE LOGIC(A3,A5)	J
/	45139-99				1							BOARD,PL SH LAM	J
2E	45140				X							MSTR ARTWORK SCAN DR LOGIC	B
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	47097-2			11								TERMINAL,INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1C	47100			9								TERMINAL,CLINCH PIN,TURRET	A
1D	49735			1								PWR-TOP FR OVRD LIM,SUBCKT	B
/	49735-99				1							BOARD,PL SH LAM PER MIL-P-13949	B
1D	49734				X							MSTR ARTWK DWG-TOP FR LIM OVRD SUR	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	49737			1								PWR, LONG FR CMD SUBCKT	B
/	49737-99				1							BOARD,PL SH LAM PFR MIL-P-13949	B
1D	49736				X							MASTER ARTWK DWG-LONG FR CMD SUBCK	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	49738-1			8								SPCR,INSUL	A
9A	19971			X								PRCS SPEC-CONF CTC W/SOLITHANE	A
28A	19975			X								GOPS ELEC AUTH PTS,ALT,&X-REF LIST	M
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
2A	19974			X								CONN,PLUG & RECEPT,ELEC,PRTD CKT	A
7A	19973			X								SCPN SPEC-JANTX/JANTXV XSTRS	C
10A	19071			X								SPEC-XFMRS,PEACTORS,AUD FREQ&PWR	F
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
1E	45138			X								ELEC DIAG,SCAN DR LOGIC(A3 & A5)	R
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N
5A	19449			X								SCAN FRAME LIMIT ADJ	B
3A	15580			X								PL,GOPS STATIC SENS ITEMS	A
9A	19888			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C
2F	45193		1									PWR ASSY-SCAN DRIVE AMPL(A4)	AA
1F	45200			1								PWR-SCAN DRIVE AMPL(A4)	G
/	45200-99				1							BOARD,PL SH LAM	G
2E	45233				X							MSTR ARTWORK-SCAN DR AMPL	C
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1F	47545			4								CHOKE FILTER,0.3 MH(SCD)	C
10A	19071				X							SPFC-XFMRS,PEACTORS,AUD FREQ&PWR	F
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	44997			4								INSULATOR	A

*For Rev Ltr see Note on Sheet 14.

TITLE
ELECT MODULE ASSY

REV H

NUMBER ACL 45094-2

SHEET 6

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1B	47090-1			4								WASHER, INSUL	B
1C	47097-2			5								TERMINAL, INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049				X							SPOT FONDING ELECT COMPONENTS	D
1C	47100			10								TERMINAL, CLINCH PIN, TURRET	A
9A	19971			X								PRCS SPEC-CONF CTC W/SOLITHANE	A
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
28A	19975			X								GOES ELEC AUTH PTS, ALT, & X-REF LIST	M
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
2A	19974			X								CONN, PLUG & RECEPT, ELEC, PRTO CKT	A
15A	19100			X								SILICON N-CHAN FIELD EFFECT XSTR	D
23A	19075			X								PROC SPEC, IC-FET SWITCH DRIVER	C
28A	19055			X								TEST PROC-VTSSR ELECT SUBASSYS	N
14A	19049			X								SPOT FONDING ELECT COMPONENTS	D
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
2E	45451			X								ELEC DIAG, SCAN DRIVE AMPLIFIER(A4)	U
3A	15500			X								PL, GOES STATIC SENS ITEMS	A
9A	19988			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C
2F	45131-1	1										PWR ASSY, CALIP LOGIC(A6)	W
1F	45132		1									PWR-CALIB LOGIC(A6)	F
/	45132-99			1								BOARD, PL SH LAM	F
2E	45133			X								MSTR ARTWORK-CALIP LOGIC A6	A
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1C	47097-2			10								TERMINAL, INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049			X								SPOT FONDING ELECT COMPONENTS	D
1C	47100			12								TERMINAL, CLINCH PIN, TURRET	A
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
2A	19974			X								CONN, PLUG & RECEPT, ELEC, PRTO CKT	A
9A	19971			X								PRCS SPEC-CONF CTC W/SOLITHANE	A
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
28A	19975			X								GOES ELEC AUTH PTS, ALT, & X-REF LIST	M
8A	19079			X								SPEC - XFMRs, PULSE - LOW PWR	C
1E	44901			X								ELECT DIAG, CALIP LOGIC(A6)	R
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
14A	19049			X								SPOT FONDING ELECT COMPONENTS	D
28A	19055			X								TEST PROC-VTSSR ELECT SUBASSYS	N
3A	15500			X								PL, GOES STATIC SENS ITEMS	A
9A	19988			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C

TITLE

REV H

NUMBER ACL 45094-2

ELECT MODULE ASSY

SHEET 7

ORIGINAL PAGE IS
OF POOR QUALITY.

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
2F	45134		1									PWR ASSY-CALIB DRIVER(A7)	*
1F	45135			1								PWR-CALIB DRIVER(A7)	E
/	45135-99				1							BOARD, PLASTIC SH LAM	E
2E	45136				X							MASTER ARTWORK CALIB DRIVER A7	C
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	47100			11								TERMINAL, CLINCH PIN, TURRET	A
1C	47097-2			8								TERMINAL, INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
9A	19971			X								PROCS SPEC-CONF CTC W/SOLITHANE	A
28A	19975			X								GOES ELEC AUTH PTS, ALT, &X-REF LIST	M
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
2A	19974			X								CONN, PLUG & RECEPT, ELEC, PRD CKT	A
10A	19078			X								SCRN SPEC, MAGNETIC LATCHING RELAYS	E
10A	19071			X								SPEC-XFMRS, PEACTOPS, AUD FREQ&PWR	F
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N
2E	45211			X								ELEC DIAG, CALIB DRIVER(A7)	*
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
94A	15738			X								PARAMETER ADJUSTMENT PROC	A
3A	15580			X								PL, GCS STATIC SENS ITEMS	A
9A	19088			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C
2F	45103		1									PWR ASSY-COMMAND RELAY(A8)	M
/	45103-99			1								EPOXY GLASS LAM, .031THK	M
1F	45104			1								PWR-COMMAND RELAY(A8)	F
/	45104-99				1							BOARD, PL SH LAM	F
2F	45105				X							MSTR ARTWORK-CMD RELAY	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1B	47090			6								WASHER, INSUL	B
1C	47097-2			6								TERMINAL, INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
9A	19971			X								PROCS SPEC-CONF CTC W/SOLITHANE	A
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
28A	19975			X								GOES ELEC AUTH PTS, ALT, &X-REF LIST	M
10A	19078			X								SCRN SPEC, MAGNETIC LATCHING RELAYS	E
10A	19082			X								SCREENING SPEC DIODES	C
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
2A	19974			X								CONN, PLUG & RECEPT, ELEC, PRD CKT	A

*For Rev Ltr see Note on Sheet 14.

TITLE	REV H	NUMBER	ACL 45094-2
ELECT MODULE ASSY			
		SHEET	8

ORIGINAL PAGE IS
OF POOR QUALITY

SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1E	44732			X								ELEC DIAG-COMMAND RELAYS(A8)	F
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
2F	45117		1									PWR ASSY-GAIN,TEMP & COMMAND(A9)	P
1F	45118			1								PWR-GAIN TEMP & COMMAND(A9)	D
/	45118-99				1							BOARD,PL SH LAM	D
1E	45119				X							MSTR ARTWORK-GAIN TEMP & CMD	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	47100				6							TERMINAL,CLINCH PIN,TURRET	A
1C	47097-2				12							TERMINAL,INSUL BASE	A
/	47097-99					1						BASE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
10A	19071			X								SPEC-XFMRS,REACTORS,AUD FREQ&PWR	F
9A	19971			X								PROCS SPEC-CONF CTG W/SOLITHANE	A
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
28A	19975			X								GOES ELEC AUTH PTS,ALT,&X-REF LIST	M
2A	19974			X								CONN,PLUG & RECEPT,ELEC,PRTD CKT	A
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
4F	44969			X								ELEC DIAG-GAIN TEMP & COMMAND(A9)	F
3A	15580			X								PL,GOES STATIC SENS ITEMS	A
9A	19A88			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C
2F	45124		2									PWR ASSY-VIS & THRML AMPL(A10&A11)	*
1F	45125			1								PWR-VIS & THERMAL AMPL(A10,A11)	J
/	45125-99				1							BOARD,PL SH LAM	J
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
2E	45126				X							MSTR ARTWORK,VIS & THRML AMP	B
1B	47090-1				4							WASHER, INSUL	B
1C	47100				7							TERMINAL,CLINCH PIN,TURRET	A
9A	19971			X								PROCS SPEC-CONF CTG W/SOLITHANE	A
23A	19075			X								PROC SPEC,IC-FET SWITCH DRIVER	C
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
10A	19071			X								SPFC-XFMRS,REACTORS,AUD FREQ&PWR	F
28A	19975			X								GOES ELEC AUTH PTS,ALT,&X-REF LIST	M
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C
2A	19974			X								CONN,PLUG & RECEPT,ELEC,PRTD CKT	A
15A	19180			X								SILICON N-CHAN FIELD EFFECT XSTR	D

*For Rev Ltr see Note on Sheet 14.

TITLE	REV	H	NUMBER	ACL 45094-2
ELECT MODULE ASSY				
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SIZE DRAWING NO.		NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE		REV
		0	1	2	3	4	5	6	7	8	9			
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D	
2J	45197			X								ELEC DIAG-VTS&THRM AMPL(A10&A11)	P	
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B	
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N	
94A	15738			X								PARAMETER ADJUSTMENT PROC	A	
3A	15580			X								PL,GOES STATIC SENS ITEMS	A	
9A	19008			X								GSPEC PROT ST SENS ELEC PTS & EQPT	C	
2F	47779	1										PWR ASSY-VIS,THRM FOC MTR DR(A12)	D	
1F	45122		1									PWR-FOCUS MOTOR DRIVER(A12)	D	
/	45122-99				1							BOARD,PL SH LAM	D	
2E	45123				X							MSTR ARTWORK-FOC MOTOR DR	A	
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B	
1C	47140			6								TERMINAL,CLYNCH PIN,TURRET	A	
1C	47097-2		1									TERMINAL,INSUL BASE	A	
/	47097-99				1							BASE	A	
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D	
9A	19971			X								PRCS SPEC-CONF CTG W/SOLITHANE	A	
28A	19975			X								GOFS ELEC AUTH PTS,ALT,&X-REF LIST	M	
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A	
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C	
2A	19974			X								CONN,PLUG & RECEPT,ELEC,PRTD CKT	A	
2F	47780			X								ELEC DIAG-VIS,THRM FOC MTR DRIVER	B	
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B	
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D	
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N	
2F	49364	1										PWR ASSY-TEMP MON/HV MON BFR A13	*	
1F	49363		1									PWR-TEMP MON & HV MON BUFFER A13	A	
/	49363-99				1							BOARD,PLASTIC SH LAM	A	
1F	49362				X							MSTR ARTWK,TEMP MON & HV MON BFR	A	
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B	
2F	49365			X								ELEC DIAG-TEMP MON&HV MON BFR A13	*	
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B	
9A	19971			X								PRCS SPEC-CONF CTG W/SOLITHANE	A	
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D	
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N	
94A	15738			X								PARAMETER ADJUSTMENT PROC	A	
28A	19975			X								GOFS ELEC AUTH PTS,ALT,&X-REF LIST	M	
2A	19974			X								CONN,PLUG & RECEPT,ELEC,PRTD CKT	A	
7A	19973			X								SCRN SPEC-JANTX/JANTXV XSTRS	C	
3A	15580			X								PL,GOES STATIC SENS ITEMS	A	

*For Rev Ltr see Note on Sheet 14.

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
9A	19000		X									GSPEC PROT ST SENS ELEC PTS & EQPT	C
1D	45708	1										EMI FILTER ASSY,A15	L
1D	44996		1									HOUSING,EMI FILTER	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46097		2									SCREW LOCK,FEMALE	C
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46080		1									STRIP,GROUND EMI FILTER	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46269			4								WASHER,SHOULDER	C
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
40A	WL45094-2		X									WIRE LIST,ELECTRONICS MODULE	C
4A	19970		X									IDENTIFICATION OF BULK ITEMS	A
10A	19010		X									CONNECTOR,FILTER PIN	F
2J	45094		X									ELECTRONICS MODULE ASSY(UNIT 2)	Y
14A	19049		X									SPOT BONDING ELECT COMPONENTS	D
13A	19104		X									IDENT OF DETAIL PTS & ASSYS	B
1D	46028	1										BAR,GROUND	C
/	46028-99		2									GROUND BAR	C
/	46028-98		1									INSULATOR	C
13A	19104		X									IDENT OF DETAIL PTS & ASSYS	B
14A	19049		X									SPOT BONDING ELECT COMPONENTS	D
1D	49458-1	AR										NAMEPLATE,ELECT MOD-VISSR/GOES	A
1D	49458-2	AR										NAMEPLATE,ELECT MOD-VISSR/GOES	A
1D	47580	1										REGULATOR ASSY-DUAL,+5V	E
1D	47577		2									BOARD ASSY-REGULATOR,+5V	E
1D	47576			1								TERMINAL BOARD-REGULATOR,+5V	B
/	47576-99				1							BOARD	B
1C	47097-2			1								TERMINAL,INSUL BASE	A
/	47097-99				1							BASE	A
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
28A	19055			X								TEST PROC-VISSR ELECT SUBASSYS	N
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
28A	19975			X								GOES ELEC AUTH PTS,ALT,8X-REF LIST	M
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
1D	47578			X								SCHEM DIAG-VOLTAGE REGULATOR,+5V	B
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
1D	47627		1									NETWORK ASSY-DECOUPLER,-5V	C
1D	47581			1								BRACKET,SUPPORT	C
/	47581-99				1							BRACKET	C
1C	47097-2			7								TERMINAL,INSUL BASE	A

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ELECT MODULE ASSY

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE NEXT ASSY										NOMENCLATURE	REV
		0	1	2	3	4	5	6	7	8	9		
/	47097-99					1						BASE	A
14A	19049					X						SPOT BONDING ELECT COMPONENTS	D
4A	18962				X							PROC SPEC, BONDING W/EPDXY ADHESIVE	B
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1D	47581			1								BRACKET, SUPPORT	C
/	475A1-99					1						BRACKET	C
9A	19971			X								PROC SPEC-CONF CTC W/SOLITHANE	A
4A	19970			X								IDENTIFICATION OF BULK ITEMS	A
14A	19049			X								SPOT BONDING ELECT COMPONENTS	D
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
2J	49462			X								WIR DIAG, ELECT MOD-VISSR/GOES	A
1C	47667		2									TRANSISTOR (MAKE FR 2N3752)	A
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
20A	19179			X								XSTR, SILICON, HI PWR, 2N3752	D
1F	46904-1		2									INSULATOR, CONNECTOR PIN	A
1B	46904-2		10									INSULATOR, CONNECTOR PIN	A
1B	46904-3		1									INSULATOR, CONNECTOR PIN	A
1C	47355-1		5									CABLE, BRAIDED	A
1C	47355-2		3									CABLE, BRAIDED	A
1C	47355-3		4									CABLE, BRAIDED	A
1B	47269		1									SPACER, MOUNTING-INDUCTOR	A
1B	46030-1		4									SPACER	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46030-2		1									SPACER	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46030-3		1									SPACER	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46030-4		1									SPACER	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1F	46029		2									SPACER, GROUND BAR, LOWER	C
/	46029-99					1						SPACER	C
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1B	46381		26									PCR-TAINER MODIFIED	B
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1C	46436-1		1									SENSOR ASSY, TEMP	D
1B	45532-2				1							TERMINAL SENSOR	B
1D	49405				1							THERMISTOR, PRECISION (SCD)	A
7A	19212					X						SCREENING SPEC-THERMISTORS	D
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1D	46747		1									CHOKE COIL	C

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ELECT MODULE ASSY

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SIZE	DRAWING NO.	NO. REQUIRED FOR ONE										NOMENCLATURE	REV
		NEXT ASSY											
		0	1	2	3	4	5	6	7	8	9		
10A	19071			X								SPEC-XFMRS,PEACTOPS,AUD FREQ&PWR	F
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1C	47575		1									HEATSINK-RFS & XSTR	*
13A	19104			X								IDENT OF DETAIL PTS & ASSYS	B
1C	4A070		1									KIT,CONNECTOR SAVER	E
1C	2A304			AR								SCREW LOCK,FEMALE (CONNECTOR SAVER)	C
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	2A304-1			AR								SCREW LOCK,FEMALE (CONNECTOR SAVER)	C
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
1C	27114			1								WEAR CONNECTOR	A
/	27114-99				1							CONNECTOR	A
13A	19104				X							IDENT OF DETAIL PTS & ASSYS	B
14A	19049				X							SPOT BONDING ELECT COMPONENTS	D
1C	29954-1			1								CONN SAVER,MOD(M/F DB89PS-NM1)	A
1C	29954-2			1								CONN SAVER,MOD(M/F DB825PS-NM1)	A
1C	29954-3			1								CONN SAVER,MOD(M/F DB825PS-NM1)	A
1C	29954-4			1								CONN SAVER,MOD(M/F DCB37PS-NM1)	A
1C	29954-5			1								CONN SAVER,MOD(M/F DCB37PS-NM1)	A
10A	19010				X							CONNECTOR,FILTER PIN	F
13A	19104		X									IDENT OF DETAIL PTS & ASSYS	B
9A	19971		X									PRCS SPEC-CONF CTG W/SOLITHANE	A
40A	WL45094-2		X									WIRE LIST,ELECTRONICS MODULE	C
2J	49462		X									WIR DIAG,ELECT MOD-VISSR/GOES	A
37A	19282		X									TEST PROCEDURE VISSR ELECT MODULE	F
14A	19049		X									SPOT BONDING ELECT COMPONENTS	D
10A	19010		X									CONNECTOR,FILTER PIN	F
1F	27247		X									HOLDING FIXTURE-INTERCONN BOARD	A
4A	19970		X									IDENTIFICATION OF BULK ITEMS	A
10A	19078		X									SCRN.SPEC,MAGNETIC LATCHING RELAYS	E
6F	27244		X									ELECT CONNECTION DIAG,ELECT MOD	C
3A	15500		X									PL,GCES STATIC SENS ITEMS	A
9A	19808		X									GSPEC PROT ST SENS ELEC PTS & EQPT	C

*For Rev Ltr see Note on Sheet 14.

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NOTE

At asterisk (*) appearing in the Revision Letter column on the preceding pages identifies a released but unincorporated change to the listed document. The data contained within each released E.O. is included in this ACL. Each affected document, its current revision letter and released outstanding E.O.(s) are listed below.

<u>DRAWING NO.</u>	REV <u>LTR</u>	<u>APPLICABLE E.O. NO(s)</u>
45124	U	4148, 4452
45134	S	4450
45137	V	4434, 4437, 4442
45211	R	4453
47575	B	4504
49364	B	4451
49365	A	4454

In addition, the following listed documents have an unincorporated change in process as indicated by the applicable ECR number.

<u>DRAWING NO.</u>	REV <u>LTR</u>	<u>APPLICABLE ECR NO(s)</u>
19055	N	426/01
45094	Y	475/01R1 (End-Of-Contract Effectivity)

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